READER REPORTS: YOU EVALUATE THE PRODUCTS!!

An Air Age Publication

MODEL AIRPLANE

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THE WORLD'S PREMIER R/C MODELING MAGAZINE

Models BIGGER than Full-Scale!

EXCLUSIVE: R/C Balloon

SMALL PLANE ISSUE

Best in the World— SCALE MASTERS '87

TWO Construction Articles

Inverted Chopper Flying

0 71896 48120 04

APRIL 1988 VOLUME 116, NUMBER 4

MODEL AIRPLANE NEWS

ON THE COVER: Budd Davisson's lens captures the homebuilt Pazmany breaking away during a photo session while Charlie Kenney's Rozier R/C balloon floats serenely into our title. Photo by Charlie Kenney. Charlie Nelson's superb Waco VKS-7 patiently awaits its turn at the Scale Masters. Photo by Rich Uravitch.

ABOVE: This colorful version of the Smith Miniplane is representative of the small-plane segment of the full-scale movement. They get even smaller than some of our models. Budd Davisson connects the activities in this issue. Photo by Budd Davisson.

FEATURES

CONSTRUCTION

COLUMNS

COLUMNS

DEPARTMENTS

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Editorial

by RICH URAVITCH

I'VE BEEN WORKING this side of the street for a rather short time, but long enough to realize that if this magazine is to continue its growth, it should be prepared to listen to, and try to be responsive to, readers' input. That's why we've added new columns like "Quiet Flight," brought "Four-Stroke Forum" back as a bimonthly, expanded the helicopter coverage and invited you to participate in our "Field and Bench" product reviews.

A lot of the mail that crosses my desk each month deals with the subjects covered in our "Small Steps" column, authored in alternating months by Joe Wagner and Randy Randolph. There's obviously a whole lot of small-airplane R/Cing going on. As a reader recently pointed out to me, "Small airplanes are not experiencing a comeback; they've been there all the time, and the number of people involved is growing. They just don't get the recognition they deserve!" Think about this; it's probably true. A lot of us are caught up with the high-performance, acre-eating models like pattern ships or jets and never, or at least not recently, have given the smaller stuff a look. That's the reason for this issue. After looking over what's out there, I've concluded that those doing the small stuff have a selection of models nearly as broad as the larger versions, many of which don't take a back seat in performance either.

The question of economy of operation is really undisputed; the cost of building is always less, but the ability to *fly* them in a lot more places is becoming increasingly important. A lot of the small birds are now electric powered, and I understand that the new Kyosho Flash EP (electric) delivers very pattern-like performance. The Micro Laser in this issue is probably as small as small can get in R/C scale airplanes, and the G-Man represents an easy-to-build, nice-flying bird with sport-type performance. The *biggest* airplane we've featured in this issue is the EZ Supra Fly 25. To keep the ball rolling, one of the next issue's kit reviews will be the GMP Bumble Vee and Killer Vee, both designed for 1/2A through .10 power. Let us know what you think. ■

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Airwaves

Anti-ARF Gun

I think I'm going to be sick! *MAN* did aeromodeling a great disservice glorifying ARFs in the February '88 issue.

Sure they will fly,if you put enough power in the nose, and a few of the 60 models I've built were ARFs (to my regret), but the fact remains that a favorable wing-load is more valuable than saved time. I notice that you don't have much to say about wing-load.

Okay, the hot-dogs are not too concerned with the fact that heavy models *must* fly fast just to stay airborne, but there are a lot of beginners out there who read *MAN* and will come away with the idea that there is nothing wrong with ARFs. But one's first R/C model *must* fly slowly, or learning to fly R/C is futile.

Of course, some ARFs are not plastic guided missiles but are actually built up in the same manner as conventional kits. These are not only in the minority, but also the price is out of sight... and they're *still* not as light as an old-fashioned, primary R/C trainer.

Finally, the construction of conventional balsa kits (and scratch-building) attracts people who are serious aeromodelers; creative people; people who take aerodynamics quite seriously—not kids looking for some remote-control toy. Life is not too short to put a conventional model together. I once built eighteen of them during an eighteen-month period. If you don't have time to spend a month of evenings to make a superior model, then you must be doing something very wrong with your spare time. Building models is a heck of a lot more fun (and less expensive) than bar-hopping or visiting the kinfolk.

JIM WATERMAN
San Antonio, Texas

I had a response for Mr. Waterman in mind, but would any of you kids *who are non-*serious aeromodelers, uncreative, *don't* take aerodynamics seriously *enough and continue to fly ARFs care to respond? Mr. Waterman just may have captured the record for building 18 airplanes in as many months; wonder why? HHmmmmm?? Just imagine the production capability if the* kinfolk *pitched in!?* RAU

...And The Beat Goes On!!

I just finished reading Mr. Anthony Featherstone's letter in the January issue of *MAN*, and I was thoroughly disgusted. It's ludicrous to suggest that a review of a warbird, no matter what its vintage, is military propaganda. The reference to military aircraft symbolizing "unnecessary suffering, death and destruction," should be looked at in an entirely different light—that of deterrence and freedom. Perhaps Mr. Featherstone would like us to bury our heads in the sand. Our military present and past would fade away to nothing more than a bad dream. The problem is that when we wake up, we may look to the skies, only to see squadrons of MIGs flying around as if they owned the place—and they probably would.

Keep up the good work, *MAN*, and keep the warbird reports coming.

RANDY ENGLAND
Coronach, Saskatchewan, Canada

Hooray For Small Planes!

Thanks for the fantastic magazine. I'm 13 years old and am a newcomer to the airplane hobby. I've read most issues (back to about '83) pretty thoroughly, and I wear them out.

I tend to stick with the .049 stick flyers or sport planes. They're good for a smaller budget.

In past issues, you haven't written very much about small airplanes. I

(Continued on page 10)

Airwaves

(Continued from page 8)

appreciate "Small Steps" and "Hints & Kinks." In your February issue, you sold plans for only *one* .049 plane, the Twiliter. I think others are missing the .049s too.

An article on .049 engines, airplane plans, and the best radio equipment for these airplanes would be appreciated.

By covering everything, I think you'll be that much more popular with me.

EMIL LIEBHABUR
Waterman, Illinois

Emil, we hope this issue meets with your approval. The Osprey biplane in last month's issue might be just what you're looking for. It's great to hear from younger newcomers like you, many of whom have "crossed over" from the equally exciting world of R/C Car Action. *Hope we're now more popular.* RAU

Better Late Than . . .

I enjoyed your editorial in the January 1988 *MAN* commenting on projects built.

I've been intending to write this letter for 60 years. Your January editorial has pushed me to it. Basically it's a reader evaluation of your Tri-Motor Ford Monoplane Model featured in the July 1929 issue.

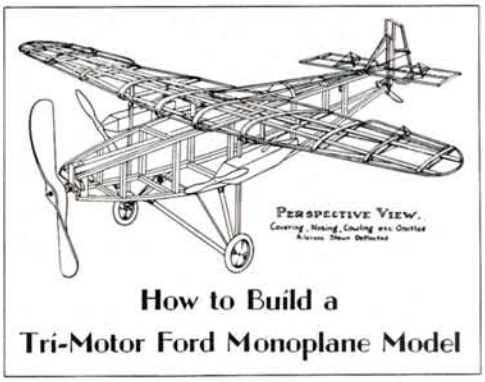
I built this plane; it didn't fly; I rebuilt it several times; it still didn't fly. Never heard of anyone who made it fly. Evaluation: *impossible* to fly, if built per plan.

I suggest that you run a contest to see if anyone could build this plane and make it fly—built strictly to plans and with materials listed (spruce and nails, no balsa, except three bulkheads). Hold an annual Fly-in. At 70, I don't know whether I'd compete, but it sure would be nice to know whether I goofed or if the product was n.g. Also, it would be a challenge to today's modelers.

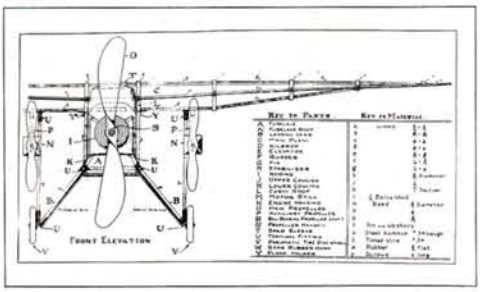
Today, I build and fly R/C models. Modern materials make it easy and eliminate most of the challenge. Still reading *MAN*.

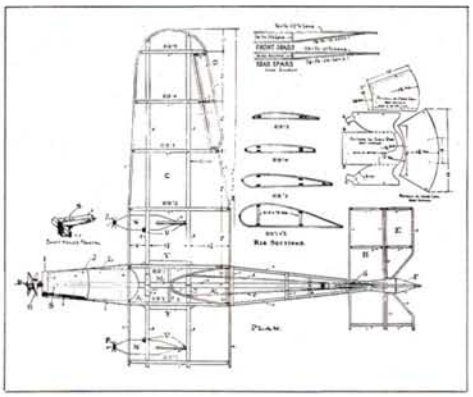
ARTHUR CERVENKA
Rockledge, Florida

Art, I researched the Model Airplane News *archives and came up with the July 1929 issue with the Ford Tri-Motor. Can you readers imagine, no CA, no Mono-Kote,* no balsa*!! Although we don't plan a contest to validate the design, it appears to be as capable of sustained flight as a cinder block! Sorry that it took so long for you to finally write to us, but welcome back to the exciting world of modeling!* RAU



How to Build a Tri-Motor Ford Monoplane Model





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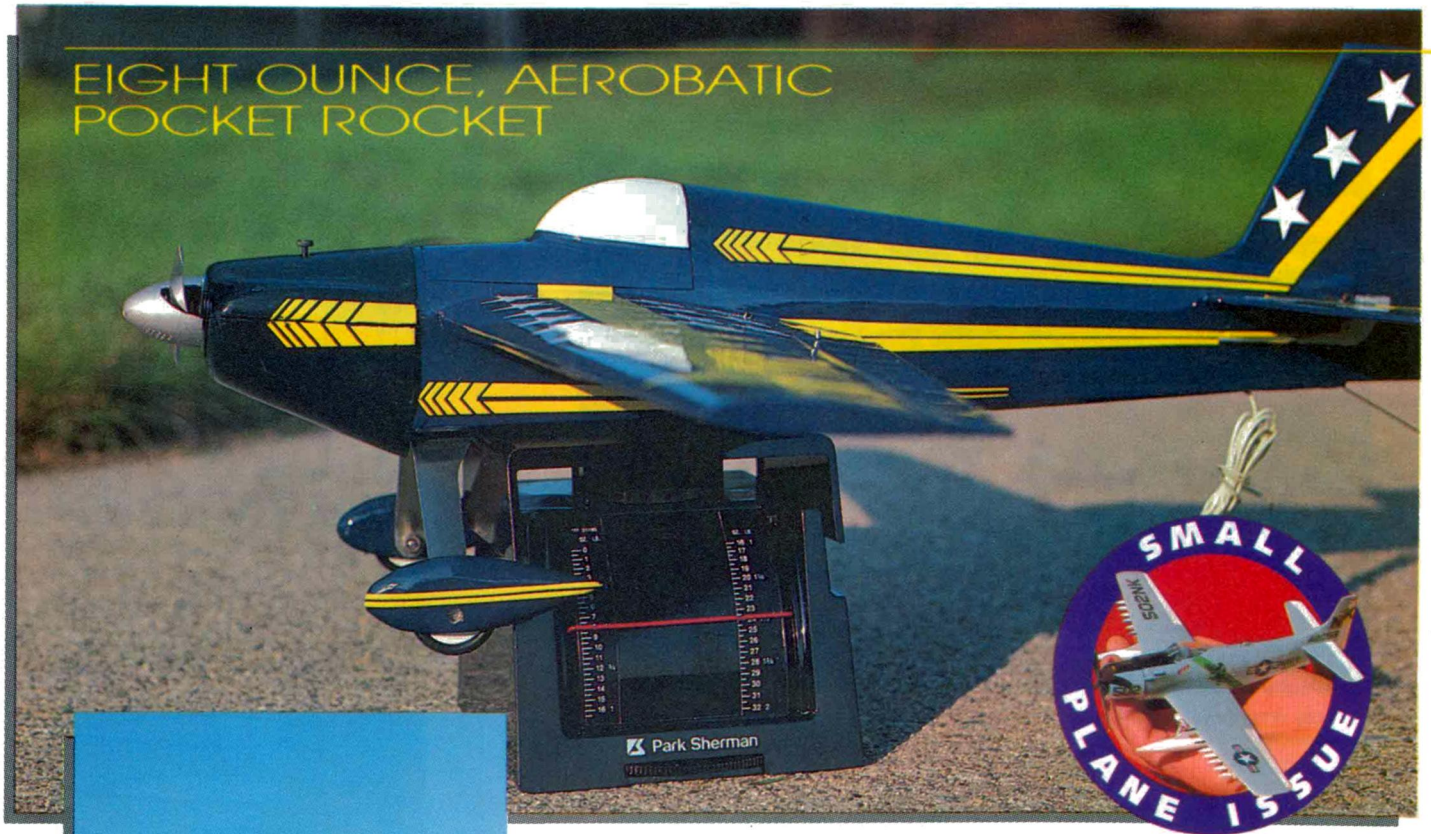
EIGHT OUNCE, AEROBATIC POCKET ROCKET

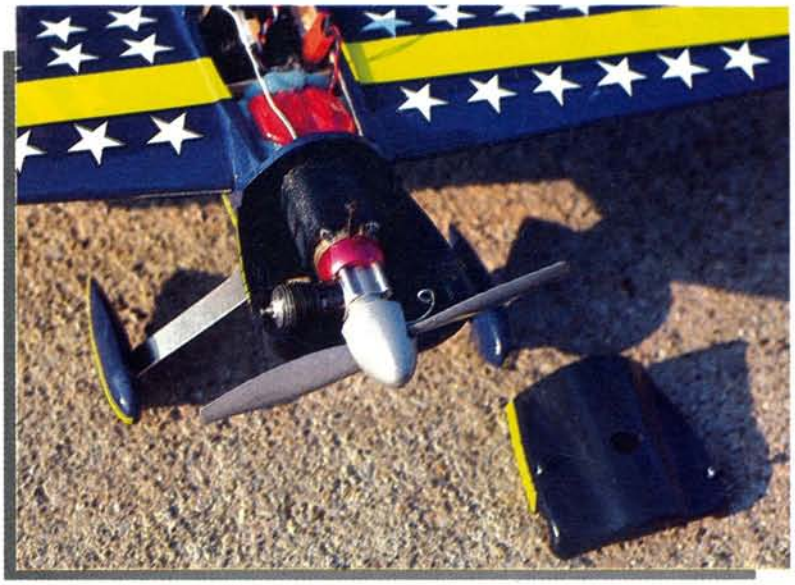


MICRO LASER

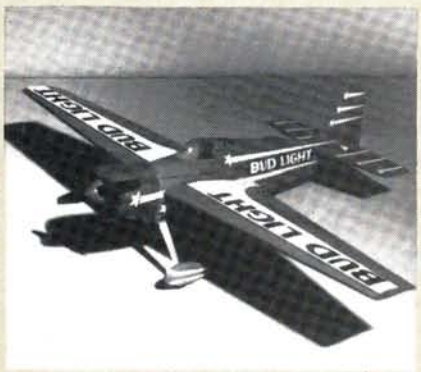
by BOB COOK

NESTLED IN THE HILLS of northern New Jersey is a very special place called Sussex. To most of you this might not mean much, but to me Sussex means the Sussex Airport and the Sussex Airport means the Sussex Air Show. For those of you who still haven't figured out where all of this is leading, the Sussex Air Show means Leo Laudenslager, Jim Roberts and *two* Laser 200s!

Sussex is the place where the two original Laser aircraft were designed, built and tested, and it's the home base for Laudenslager, Roberts and their incredible airplanes. When they perform for the hometown crowd at



Tidy installation of the Cox .020 engine is evident in this photo. Jewel of an airplane!



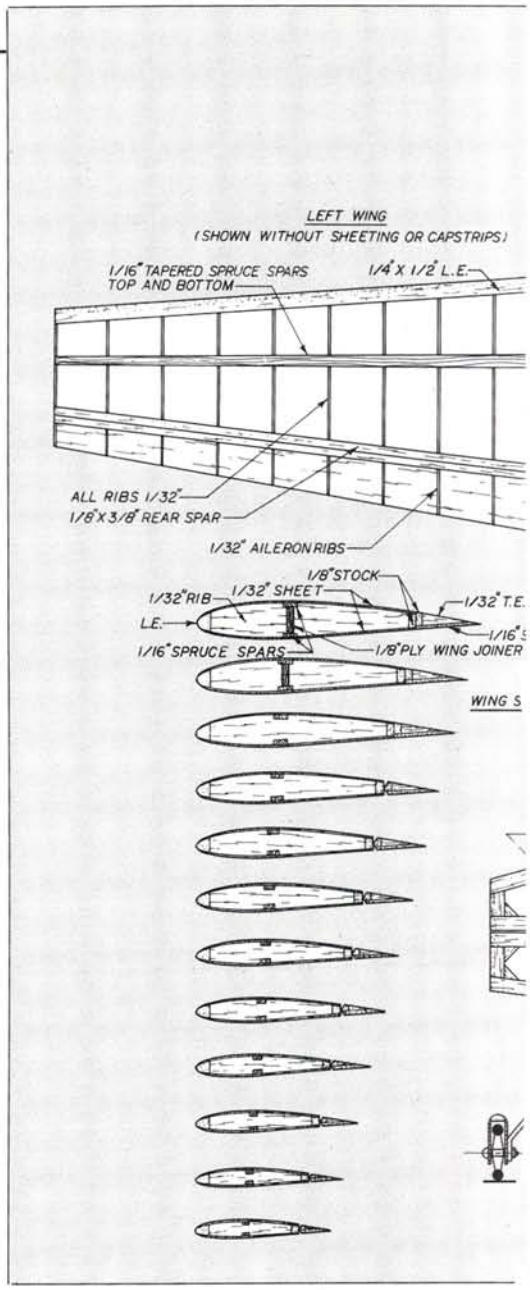
#4882 MICRO-LASER $8.50

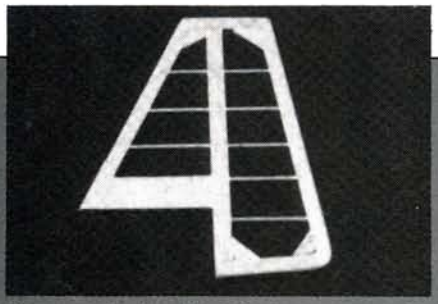
Two-foot, 2-channel, .02-powered double-dynamite mini-sport scaler from Bob Cook. Ninety-square-inch area and 8-ounce weight provides spritely performance on minimum building budget. Not recommended for beginners, but the experienced flyer will have a ball.

the Sussex Air Show, it's a truly spectacular sight and absolutely the best demonstration of aerobatic flying to be seen anywhere. I've seen these champion pilots put their Lasers through their paces many times over the years.

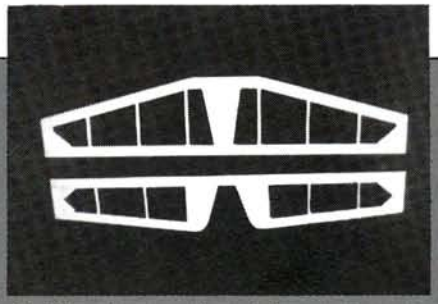
Naturally, I just had to have my own R/C model Laser. I found plenty of Laser model kits on the market in 1/5 scale, 1/4 scale and even 1/3-scale monsters but, not being one to follow the crowd, I decided to build my model from scratch, using drawings and photographs of the full-scale planes. I also wanted to make a model that would somehow stand out among other Laser models; but how? After all, all Lasers look alike and I certainly wasn't about to try building anything larger than the big 1/3-scale models.

How about the other extreme? I decided to build the *smallest* possible Laser! Believe me, this is a lot easier said than done. Building a really small R/C model, especially a scale model, brings on a whole new set of obstacles which aren't encountered when building

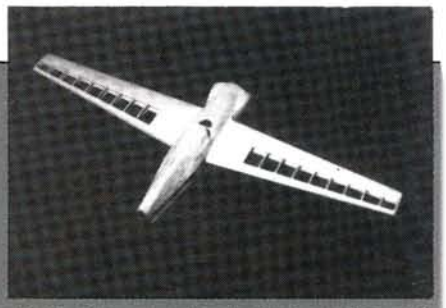




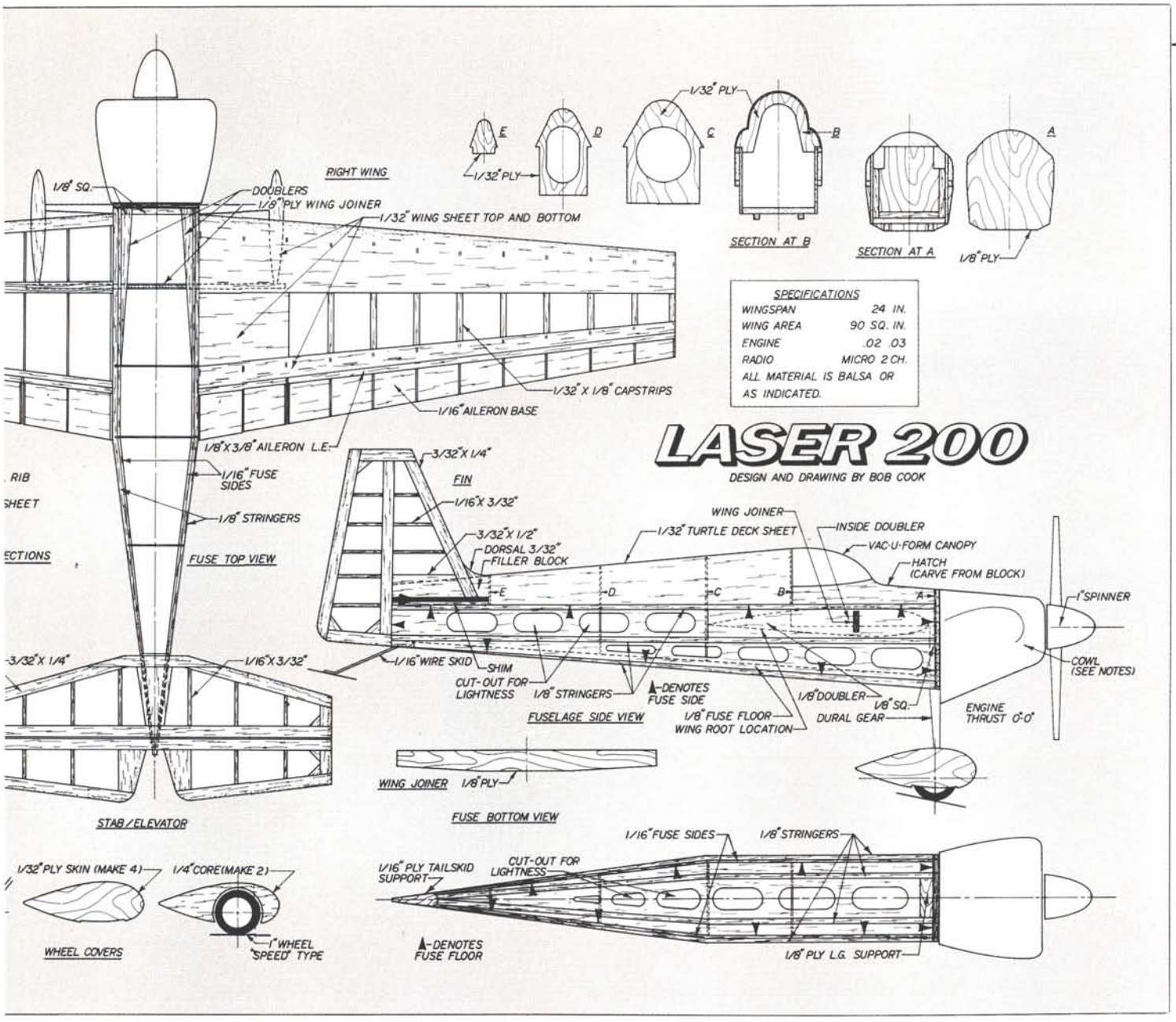
Framework of vertical fin. Laser uses only two channels: aileron and elevator. Rudder is fixed.



Stabilizer framework ready for covering and hinging; light but strong.



Basic airframe prior to final sanding and shaping.



FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 124.

a larger-size model.

The number one problem is weight. You've got to keep it superlight or it won't fly well. An ounce more or less in a large model is no big deal, but on a plane of this size an extra ounce may just as well be a ton. The best advice is to use every possible method of building light. Select the wood carefully, use thin-type CA and carefully sand or cut away any unnecessary material.

Another problem is the lack of usable space inside the aircraft. A small radio system is a must. Luckily, there are

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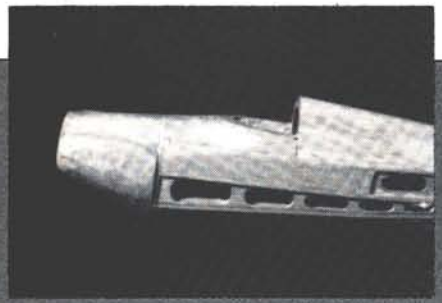
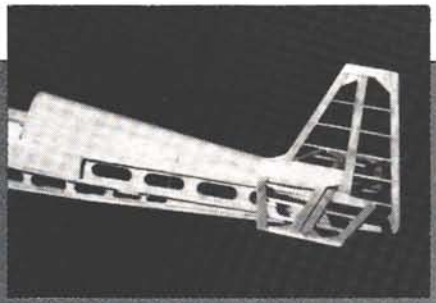
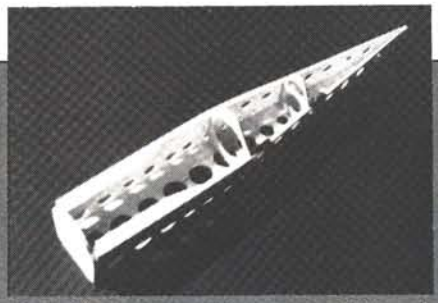


Forward section of nearly completed fuselage. Note how flat section remains, to ensure good wing joint.



Aft fuselage with all the tail-feathers attached.



Basic fuselage assembly prior to addition of turtle-deck sheeting and cowl parts.

Fifty Years Ago...

by STEVE POND

FIFTY YEARS AGO, in April 1938, *Model Airplane News* reported on a breakthrough that was to change the future of model aviation.

Reginald Denny, founder of Reginald Denny Enterprises in California (a model manufacturer and supplier), had developed a radio-control gas-powered model to be used as an artillery target for the U.S. Army. A unit of the Sixty-third Coast Artillery, under the command of Lt. Col. Claude M. Thiele, was to test its marksmanship against this radio-control airplane. The results of this test would determine whether these planes should be used as targets for anti-aircraft guns and coastal artillerymen.

The model's delicate R/C system took two years of research to develop and would permit control of the aircraft when aloft. The plane this system was installed in had a 12-foot wingspan and was powered with a 3hp 2-cylinder engine. The fuselage contained a three-tube receiving set which relayed impulses to tiny electric motors. These electric motors operated the rudder and elevators, whereas the previous escapement systems only controlled the rudder. The "transmitter" consisted of a short-wave sending set and a control box with contact points which modulated the wavelengths of the radio impulses. These were used to guide the model while it was flying.

The original caption read, "The latest fighter for the U.S. Navy; the Grumman mid-wing." We came to know it as the F4F Wildcat!

German officers, including Major Schroter, inspect the ornithopter of Mr. Lippisch.

One interesting article in that issue was by the legendary Frank Zaic—his report on German model aviation. His travels took him to the famous Borkenberge gliding and flying field run by Major Schroter, where a modeling event was being held. He says: "The events were for fuselage models, ROG and ROW, rubber-and gas-powered. Special events brought out a gas autogiro which failed to fly and a steam turbine-powered model with radio control."

Mr. Zaic reported that the Germans used hardwood and plywood as building materials since balsa was still not available: "The main handicap is the time required to construct a hardwood job, and I couldn't help but admire the patience of the contestants who did wonders with what they had on hand." Apparently, Mr. Zaic was most impressed with German sagacity.

Gracing the cover of this issue was a dramatic rendering of the then-new Grumman mid-wing naval fighter—

Actor Reginald Denny with his early drones. Northrop Ventura division can trace its ancestry directly to Denny's efforts.

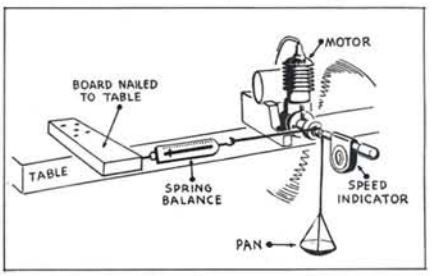
predecessor of the Hellcat and the Bearcat.

You could read about all the latest developments in full-scale aviation in the popular "Frontiers of Aviation" column which highlighted the fields of naval, commercial and military aeronautics. As always, *Model Airplane News* was there to assist the modeler in building and flying his latest winged effort.

One article concerned building a device that would determine the power of your engine—a question that always troubled modelers. The device was quite ingenious and could determine brake horsepower (BHP). (See diagram.)

As usual, the manufacturers were showcasing their latest "gas jobs" and engines. The hottest item seemed to be from the famed Ohlsson engine company. Its new, transparent, unbreakable fuel tank on the Gold Seal engine took the guesswork out of fueling. Now you could actually see how much fuel you had! How modeling has changed since then!

There were many other interesting articles in that issue, including one on

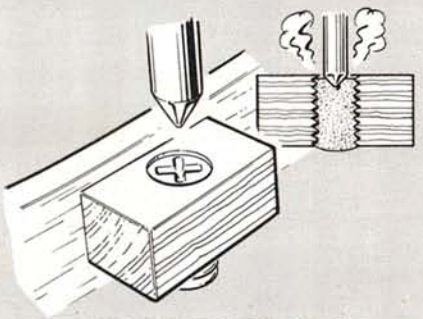


Primitive, but then effective method of measuring engine horsepower. Probably wouldn't hold up too well against today's monsters!!

soaring flight and aerodynamic principles and how you could build an Arrow Speedster. Model aviation was changing as rapidly as full-scale aviation, and *Model Airplane News* was there to report on it for the modelers of America in April 1938! ■

Hints & Kinks

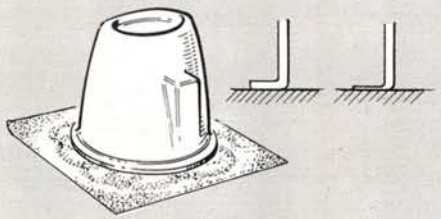
by JIM NEWMAN



NYLON BOLT EXTRACTOR

One of the most frustrating happenings at the field is to have a nylon wing-mount bolt break off short. Here's how to remove a broken one. Heat the end of a Phillips screwdriver, and then press it into the broken stub for about ⅛ inch, allowing the 'driver to cool before attempting to turn it. The heated screwdriver makes its own Phillips slot and allows the offending stub to be removed. A book of matches may have to be sacrificed, or you can heat the 'driver bit by laying it on a car's exhaust manifold.

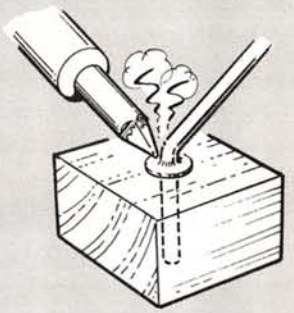
Layne Johnson, Truman, Minnesota



TRIMMING PLASTIC COWLS

Removing the excess plastic from vacuum-formed cowls can be difficult. There are tricks of the trade and here's one. Trim away as much as you can with shears, and then stand the cowl on a sheet of coarse sandpaper. Press down on the cowl while moving it in a circular motion to evenly sand away the flange. When the flange is approximately paper-thick, peel off the remains by hand, and do the final finishing with a sandpaper block and fine grit paper.

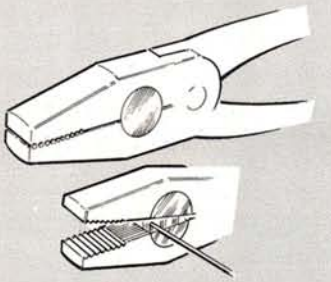
Jorge Linarcs, Bogota, Colombia, South America



AXLE SOLDERING JIG

To ensure that the inner washer is soldered square with the axle, drill a hole to snugly fit the axle wire. The wood block in which the hole is drilled may be clamped down or held in a vise, then the axle wire pushed into it. Be sure the washer is flat against the wood, then solder firmly.

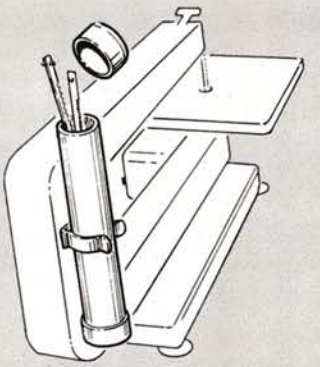
Dave Gierke, Lancaster, New York



SAFETY CUTTERS

The big danger when cutting wire with pliers is that the cut end usually takes off at high velocity. Fill the cavity in the cutting jaws with silicone tub-sealer or RTV. Wait until it has cured, and then slice it through with a soap-lubricated blade. Now, when you cut, the loose piece of wire will be securely gripped by the rubber filling. You should still wear safety glasses—just in case.

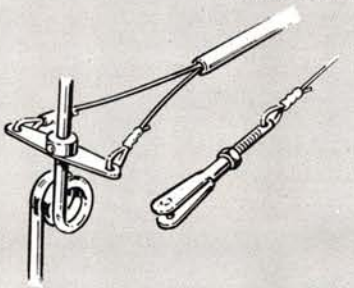
George Voss, Moore, Oklahoma



SCROLL SAW BLADE HOLDER

A piece of 1-inch PVC pipe with one end plugged and a loose cap at the upper end. The whole fits in a common, hardware-store spring clip, which is screwed to the side of the saw unit. Now those new blades are right on hand and don't have to be searched out.

Jim Cassell, Niceville, Florida



POSITIVE-RETRACT NOSE GEAR STEERING

Some retract nose gears require dial cord or nylon line steering hook-up, and this is often vague in action. Replace the lines with the thick monofilament used in weed-eater machines, using ½-inch lengths of aluminum tube as crimps. The contributor says that this method of fastening is used at each end, but I suggest that some might find it easier to have some method of adjustment at one end. Try a clevis and a brass threaded coupler as shown. Nyrod conduit shown.

John Bryant, Lilburn, Georgia

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o **Model Airplane News**, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

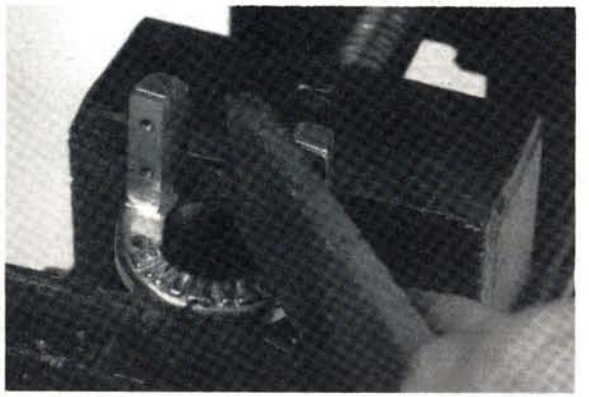
How To:

by RANDY RANDOLPH

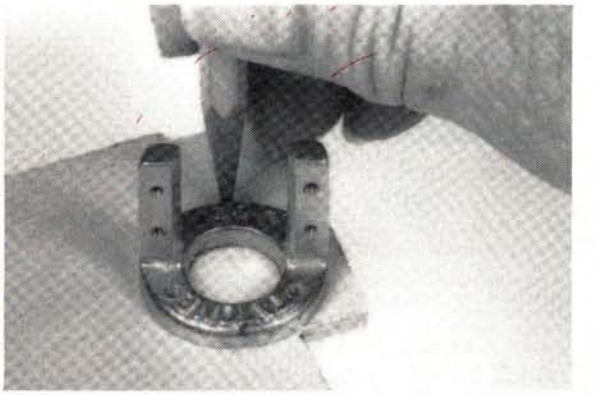
MOUNT THE .061 ENGINE

The G-Mark .061 is a rather remarkable engine, but a proper fitting beam mount is not readily available in hobby shops. The photos show how to modify the Tatone .049 mount to accept the .061 engine.

1. The Tatone .049 mount is too short and narrow to fit the .061. The tools and materials necessary to modify the mount include a ¼-inch drill, a file and a piece of ¼-inch plywood.

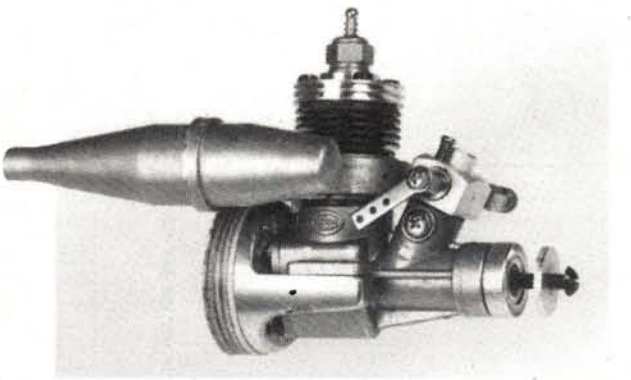


2. File the inside edges of the mounting beams to a 45-degree angle, removing about 1/16 inch from each side. This will allow a good solid fit for the .061 crankcase.



3. Use the mount as a template, and trace the outline of the mounting flange on a piece of ¼-inch aircraft plywood. Trace both the outside and the inside of the flange.

4. Cut out the traced outline from the plywood with a coping saw or jigsaw, and drill a ¼-inch hole in the center to allow a saw or a file to remove the unnecessary material in the center.



5. By re-drilling the mounting holes to match the engine and by adding the plywood spacer, the .061 finds a home. The lengthened mount is attached to the firewall with ¾-inch 2-56 bolts and T-nuts, or the plywood spacer can be epoxied to the firewall and the mount attached with No. 3 wood screws.

Field & Bench Review

EL

I'M NOT A SCALE model devotee. I've always believed that the term "model," when used in connection with airplanes, should mean "worthy of imitation" rather than "a small-scale duplication." If a model airplane doesn't look like a *model* (as opposed to a replica), it holds little interest for me. The ElectriCUB from Great Planes Manufacturing* looks enough like a model to satisfy. In fact, the kit is a dandy!

The only things needed to complete the airplane are covering material, wheels and glue. All of the die-cutting is so crisp and clean that you could get by without sanding, but I sanded anyway and so should you. The hardware packages contain screws, hinges, Velcro, double-sided tape, tail-wheel mount, landing-gear brackets, rubber bands and everything else you'll need (and some to spare).

The plans are clear, detailed and double-sided; the fuselage and its appendages are on one side, and the wings are shown on the other. This two-sided arrangement is very logical, because it makes the plans a lot more manageable. I usually end up with plans cut in pieces trying to get them to fit on my building board. Not so this time. It's nice when someone does your thinking for you!

The conversion to .10 glow-engine power is shown very well on the plans as well as in the instructions. With the new

by RANDY RANDOLPH

A Rechargeable Classic! *GREAT PLANES*

ELECTRICUB

OS.10 FP R/C and a 4-ounce fuel tank, the Cub would be one of those airplanes you fuel on Sunday and fly all week!

Kit instructions have improved so much over the years that they've almost become the textbooks of building, and the instruction book with the ElectriCUB is no exception. Numerous photographs illustrate every step, and the explanations are clear and understandable. Building is always fun, so let's get to the fun part.

CONSTRUCTION: I began, as the instructions suggested, with the fuselage. Usually, the manufacturer breaks the builder in gently with tail assemblies before he has to build the fuselage. In the case of the ElectriCUB, they get down to business right away.

The construction is a combination of solid balsa sheet and longerons. Two forward sections of the fuselage are edge-glued to form the cabin area. Actually, there are three sections, but only the middle and bottom are joined at first. Three longerons are added to each side, and then the sides are joined with the cabin formers. Next, the fuselage is turned upside down, and the top longerons are glued to a sheet-balsa crutch that's pinned to the workbench. This makes for very easy and very accurate construction; a real stroke of good engineering. The aft formers are added and joined to the longerons, and then the bottom is cross-sheeted before the fuselage is removed from the bench.

The nose is brought together with a jig sheet and the firewall is added. Once more, good engineering, because the nose of the fuselage is just as true as the aft section. Only after these operations is the third, or cabin, section added. The fore deck and windshield are then built, and the formers and stringers aft of the wing saddle are completed. The battery hatch, landing-gear mount and flight battery mounting just get built in the process without much fuss. It almost takes more time to hunt up the parts and sand them a little than to complete the fuselage. I was impressed!

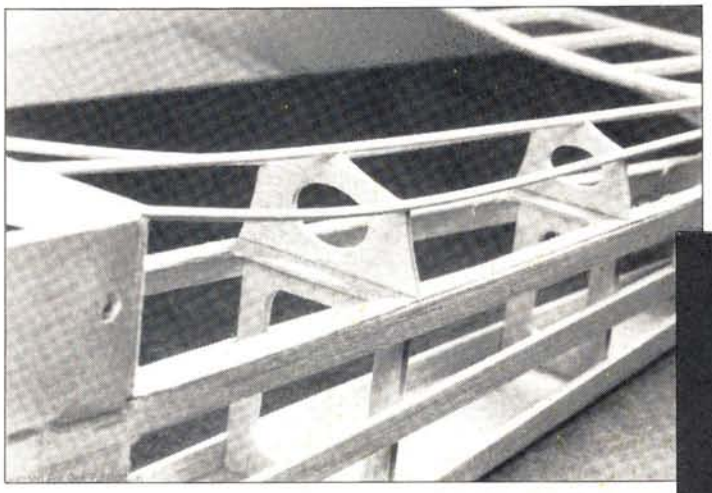
The wing is built in a manner that has become almost standard. Formed and slotted leading and trailing edges are pinned over the plan along with the bottom main spar, and the ribs are then added. The ribs have large, weight-reducing holes stamped into them, because the wood was on the heavy side.

The tips are a little different. The main spars stop at the next-to-last rib. There's a die-cut stub spar added to carry the last rib (which is tapered) and the rounded tip. This arrangement produces the proper taper, as the airfoil changes from full chord into the tip.

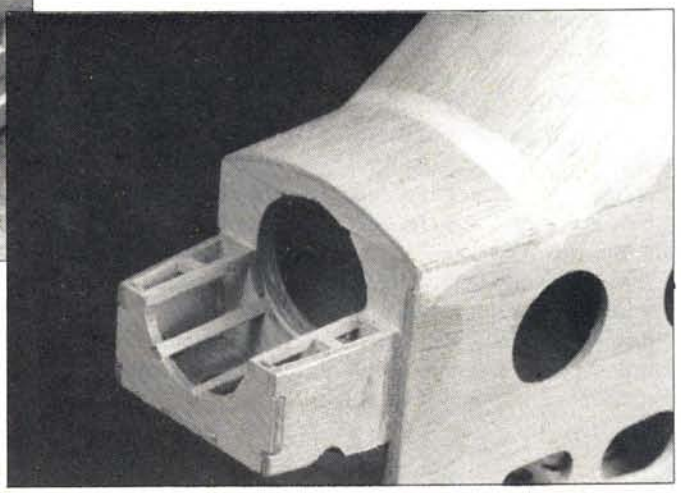
The curved tips, as well as the rudder and elevator, are built from die-cut parts that fit together very well and even match the plan! In fact, the die-cutting and parts fit is very good in the whole kit.

A rather unexpected step in the construction manual calls for the weight of the finished, uncovered structure to be against a standard range of from 12 to 14 ounces. Methods of reducing weight are then outlined, and you'll need to know these if the structure is too heavy. This is an excellent idea. My airplane hit the maximum right on the nose, but I followed the weight-reduction ideas anyway.

The instructions call for Black

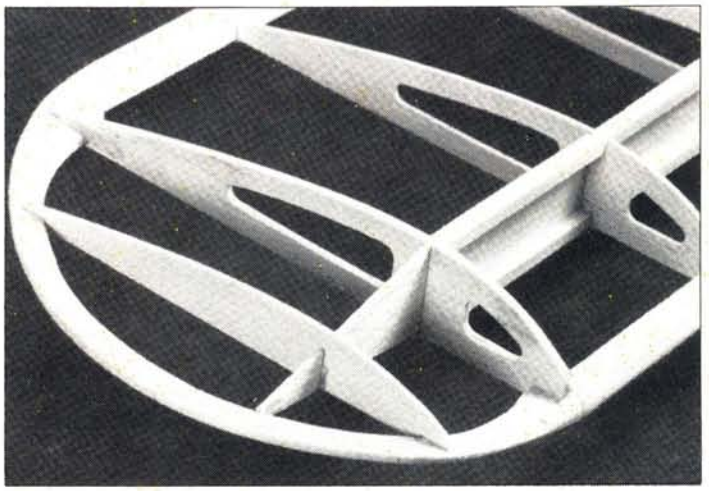


"...stays in the air for five or six minutes of smooth, nostalgic flying."



A very slick idea for achieving the smooth curve of the side cabin stringers is the use of ⅛-inch hardwood dowels. Works great.

The motor mount is built up from precut plywood parts and hardwood strips. The motor is held in place with rubber bands to reduce the chances of a bent shaft should the airplane land "nose low."



The tip is constructed (after the basic structure of the wing is complete) by adding a stub spar, then the outline and tip rib.

Baron film from Coverite* as the covering material; an excellent choice. I decided to finish my Cub in the trim of a PA-11 that I fell in love with some years ago (it had been painted to look like a PA-18) and used Cream and Fire Red. Matching Black Baron paint was used on the cowl and struts.

This was my first experience with Black Baron and I like it! As with all films, I used a cotton sock over the iron to eliminate any creases in the film, and I was careful not to reheat already-sealed seams. The trim color was placed over the base covering, smoothed with a soft cloth to squeeze out any air and then anchored with the iron. It worked really well!

A Cub is just not a Cub unless the cylinders and rocker-arm covers stick out and are shaded by eyebrow-style cowlings. The ElectriCUB is so equipped, and the cowlings look just fine! The airplane can be flown without the wing struts, but they're easy to make and the attachment system is simple.

There's plenty of room inside for radio, motor battery and everything else. The Deluxe version includes the motor, switch, fuse and a micro-switch that can be worked with the third servo for motor control. A very nice package!

PERFORMANCE: The ElectriCUB is not supposed to be an aerobatic airplane and it isn't. With a freshly charged battery pack, it will stay in the air for about five or six minutes of smooth, nostalgic flying. It not only looks like a Cub, but it flies like one. It will do a button-hook-type of loop and a pretty decent hammer-head stall but, outside of that, circles around the patch and touch-and-gos are the order of the day. Landings require a little help with power every now and again, so end each flight with a little power left in the tank, just in case.

This electric bird is a beautiful example of what a "school-yard-scale" airplane should be. It's quiet, looks great in the air and causes no pollution of any sort. It's not a trainer but, with a .10 glow engine up front and a qualified instructor, it might just meet the requirements. It's a fun airplane and, looking like that old PA-11, it brought back some memories.

**The following are the addresses of the manufacturers mentioned in this article:*

Great Planes Manufacturing, P.O. Box 721, Urbana, IL 61801.

Coverite, 420 Babylon Rd., Horsham, PA 19044. ■

READER REPORTS!

MINI FIELD & BENCH

ELECTRICUB

THE EDITORIAL in the January issue invited readers to participate in the Field and Bench kit reviews by sending in their *mini-evaluations to compare notes with our reviewer. The response has been super, with the Great Planes ElectriCUB being the first kit to be presented in this fashion. Check the January issue for projects currently underway, and keep your evaluations coming!!*

Gear Change

Robert D. Gilson of Palm Coast, FL, says: "Having always been interested in something new, I bought the ElectriCUB from Tower Hobbies*. Building the model proved to be very easy, and I followed the instructions to the letter, but with hesitation on several items which I'll discuss.

"I used Aerospan covering material from Balsa USA*. The white and blue color combination proved to be readily discernable at all attitudes and altitudes. My radio and servo installation is a standard Futaba* FP-T4NL (AM 40) except for substitution of a 250mAh battery and three S33 miniservos. The third servo is used in conjunction with a taped-on Radio Shack mini-microswitch for on/off throttle control.

"The Mabuchi .05 motor gets better with use (break-in?). The motor shaft is easily bent on nose-over landings, but is easy to bend back with care and

running checks on centering. The supplied propellor lasted until I over-tightened the nose shaft-screw. I replaced this with a Masterscrew adapter which is much more rugged and also has two shaft-lock studs. The use of a fuse and on/off safety switch is good, and the battery lock-in with Velcro works well.

"The total weight, including a 6-cell Kyosho battery pack and a Tornado 8x4 propell0r, is 49 ounces. The CG came out right, with the radio battery located just under the leading edge. I like the easy main battery installation, and use both 6- and 7-cell packs interchangeably.

"The landing-gear system proved to be inadequate for my grass-field landings. All take-offs were by hand-launching except for one touch-and-go, which ended in a bent prop shaft, owing to a gust of wind. The main gear wires were replaced by a Great Planes 9-inch dural unit. This change proved to have a negligible effect on weight and performance.

"Performance in the air is really good! I can climb to any altitude and, with the throttle cut off, glide to my heart's desire (depending on the thermals of the day). Loops and rolls have been accomplished—a bit raggedly, I'll admit, but the ElectriCUB's stability and ease of handling will delight the intermediate flyer.

"My experience with this model (my introduction to electric flying) has been thrilling and a real eye-opener for our club. I'm now fitting out an electric Aeronca C-2. I wonder how the ElectriCUB would fly with an Astro-Flight cobalt?"

"...Real Beauty"

Steve Rogers of Limestone, ME, reports:

"The DeLuxe kit comes in a very attractive well-packed box containing top-quality material. The die-cut parts are perfect, and the enclosed plans and instruction manual are so explicit that a careful first-time builder could be confident of good results. My only disappointment was the decal sheet which didn't contain the 'Lightning Bolt,' windows or 'N' numbers for the wing.

"The model assembled easily because of the well-fitting parts and excellent instructions. The fuselage seemed heavy, so I cut additional weight-reducing holes. I also cut exhaust holes and a hole for the cooling air inlet. The wing-to-fuselage attachment was done with nylon screws and ply, rather than with dowels and rubber bands as suggested. This improved the appearance of the plane. The landing-gear fairings were secured using tin-can stock instead of rubber strips. For more convenience in removing and installing the wing, I used Velcro instead of screws to attach the lower end of the wing struts to the fuselage.

"The model was covered with Coverite* Black Baron Film. The cowl was painted with Coverite's matching epoxy and was then trimmed with the supplied decals plus the license numbers, 'Lightning Bolt' and windows, which were cut from Coverite trim sheets.

"A Futaba Conquest FP4NL with two miniservos, a 7-cell 1,200mAh Kyosho motor pack, an electronic speed control, a charge plug, a pair of Williams* wheels and a tail wheel were installed. These completed the model, which weighed 48 ounces ready-to-fly. The completed model is a real beauty and an exceptionally good value."

READER REPORTS!

MINI FIELD & BENCH

High-Altitude Operation

Donald E. Reaves, of Denver, CO, writes: "I purchased the ElectriCUB locally and bought the DeLuxe kit, which included a .05 Thrustmaster motor and nylon 8x4-inch prop with hardware and a wiring harness. The salesman recommended a 6-cell, 1200mAh rechargeable battery for this package.

"The kit was built exactly as the instruction book detailed, and the book was very clear. I installed a small speed control in place of the on/off microswitch. As no covering was provided, I used Super MonoKote.

"Once completed, the aircraft was weighed and found to be within the weight limits specified in the instruction book. The 6-cell battery had to be moved quite far forward to counteract tail heaviness.

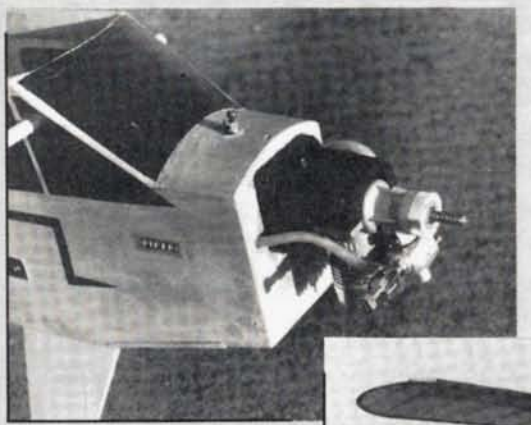
"The motor battery and receiver battery were fully charged by overnight trickle-charging. On a clear, sunny day the plane was put on an asphalt runway facing into a 5-knot breeze. The temperature was 65 degrees at 5,400 feet above sea level.

"On six consecutive attempts to take off at full throttle, the airplane simply refused to fly. Hand-launching was considered, but decided against because of insufficient thrust.

"After discussions with several R/C pilots, it was decided that the motor needed to be upgraded to a .15 to get any performance from the aircraft at this altitude. The Astro-Flight* cobalt .15 motor could be used, as its diameter is only .06 inch larger than the .05 Thrustmaster, and it weighs only one ounce more. However, the cobalt .15 requires a 12-cell, 900mAh battery, which would mandate rebuilding the plane to accommodate the new battery pack. The cost from Astro-Flight for this package (motor, battery and harness) is $99.95.

"I concluded that the ElectriCUB DeLuxe, as sold, wouldn't fly at this altitude, and that modifications could not be financially justified.

"However, I've converted my ElectriCUB to glow power, using a K&B* .20 Sportster. The electronic speed control was replaced by a Futaba servo for the throttle. The K&B is now getting its break-in runs, and we hope to flight-test the converted aircraft in the near future."



Frank White opted for the Enya .11 glow engine in a Hayes mount for the ElectriCUB. Conversion is described in instructions.

Left: *This ground-level view leaves no doubt it's a CUB.*
Above: *Slow fly-by shows classic lines, trainer-like proportions. Frank enjoyed kit.*

**The following are the addresses of the companies mentioned in this article:*

Astro-Flight Inc., 13311 Beach Ave., Marina Del Rey, CA 90292.

K&B Manufacturing, 12152 Woodruff Ave., Downey, CA 90241.

Tower Hobbies, 1608 Interstate Dr., P.O. Box 778, Champaign, IL 61820.

Balsa USA, P.O. Box 164, Marinette, WI 54143.

Futaba Corp. of America, 555 W. Victoria St., Compton, CA 90220.

Coverite, 420 Babylon Rd., Horsham, PA 19044.

Williams Bros., 181 Pawnee St., San Marcos, CA 92069. ■

Basics of Radio Control

by RANDY RANDOLPH

THE PICTURE OF THE OLD, wooden Pepsi consumer case, which many of us old-timers used as flight boxes, is just there to get your attention. My *real* subject is something that's important to those of us who enjoy basic R/C.

In 1988, the following channels will be available for the control of model airplanes. These are spaced 40kHz apart.

Channel	Frequency, mHz
12	72.030
14	72.070
16	72.110
18	72.150
20	72.190
22	72.230
24	72.270
26	72.310
28	72.350
30	72.390
32	72.430
34	72.470

Along with these new channels come changes in transmitter and receiver specifications that, supposedly, make our older equipment out-of-date. But do they?

The Dallas R/C Club has a new flying field that's exclusively for members, and here's a quotation from their newsletter, written by John Gill, the club president:

"...As you know, next winter all our old frequencies will be outlawed. If you have a radio on 72.080 (brown and white), 72.160 (blue and white), 72.240 (red and white), 72.320 (violet and white), 72.400 (orange and white), 72.960 (yellow and white) or 75.640 (green and white), this is the last season you'll be permitted to use that radio. Period. Federal law!

"We'll be allowed to begin operation on about twelve new frequencies. Isn't that good? Maybe not. We've all seen the radio problems brought on with the 40kHz spacing on channel 38 and higher.

"What I propose is this: Let the Dallas R/C Club vote to allow members to use only *some* of the new frequencies at our new field. Why? First, we can only have a maximum of four or maybe five planes in the air at any one time. Second, it will prevent most third-order interference on the upcoming channels. Third, and most important, many of you will be able to retune and keep flying with your older radios!

"We should only allow members to use 72.030 (already legal, but not very safe), 72.070, 72.150, 72.230, 72.310 and 72.390. Each of these channels is only 10kHz away from one of the old channels which will be outlawed this winter. Each is still 80kHz away from the next channel. This means that most old equipment can be retuned and, if it worked before, it will work next year at our field. Your receivers were designed to work with a spacing of 80kHz, and they'll still be within their design limits. Most, but not all, of the radios out there could just have a crystal changed and go right on. Everything you have, except for servos, will go in the garbage in 1991 anyway!

"What about contests? No change! Just as in the past, our contest guests may use any legal channel, but only when Scott (frequency control man) approves. After all, the reason that contests work *now* is because frequency control won't allow a 'bad mix' to fly together.

"Well, you have the last word on this. You can pass this rule now and avoid buying inferior radios for use between December 1987 and December 1991, so putting our private club field to good use. Why not make your own rules for your own field?

"I predict that if this plan is adopted now, within two seasons the club will vote to extend it to channels 38 and 56. That would give us ten or eleven (remember .030) good channels in the 72mHz band. No more worry about transmitter spacing, three in a row, etc. All this is for the *sport flier* and *our field.* Those who enter contests usually buy the latest, most expensive radios, have them serviced often, and have contest frequency directors protecting them so that they have no problem."

Club leaders should read John's ideas carefully and then consider similar plans for *their* fields. Most club members are sport fliers with limited budgets; without them there would be no clubs. That's basic! ■

Construction "g" M·A·N

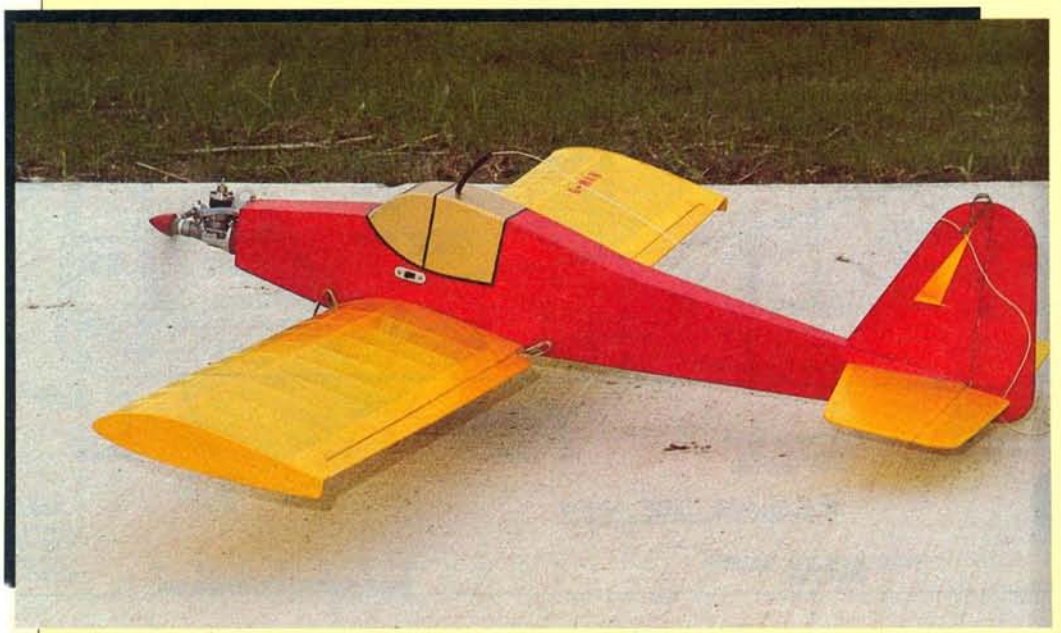
Add this One To Your Treasury Of Great Performers.

by RANDY RANDOLPH

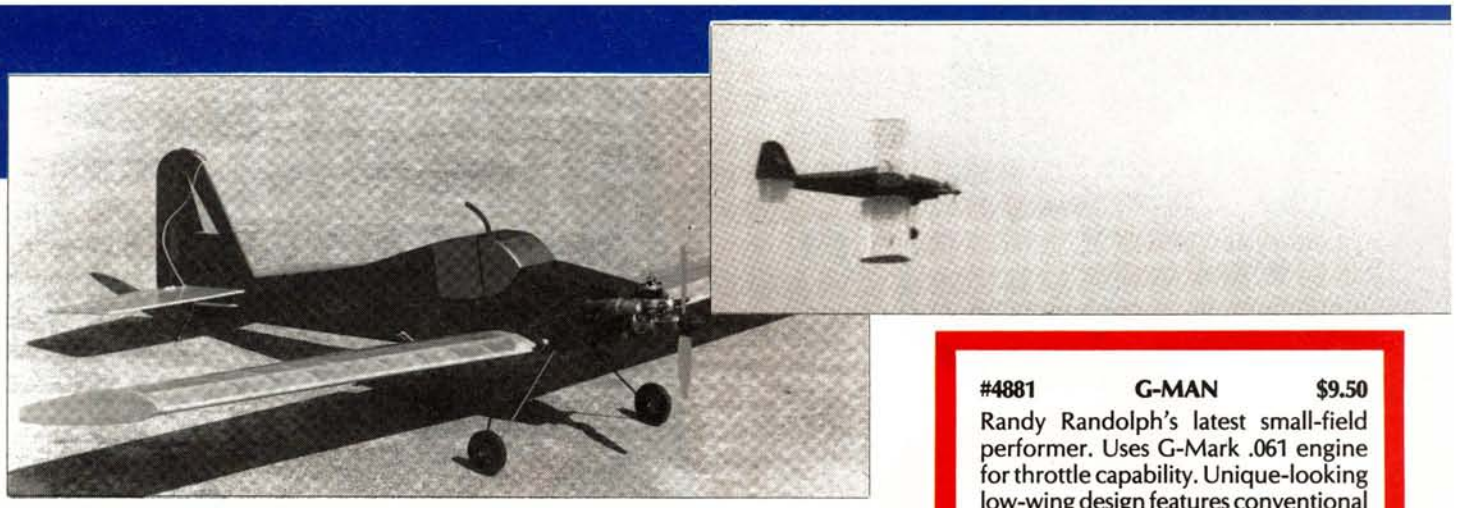
Ms. Donna Lindsey and G-Man against a blue Texas sky.

G-MAN IS A SORT OF scaled-down version of Titewad (*Model Airplane News*, October '80). The throttled-back, slow-speed flight is retained and so are the crisp, snap maneuvers and smooth, round loops. Because the wing isn't a symmetrical section, inverted flight isn't trim-free, but the reflexed tip plates help retain the same groovy upright flight characteristics. It's aerobatic as well as graceful and is often mistaken for a much larger airplane while in flight.

The G-Mark .061 R/C is an engine that's been unjustly neglected by the majority of modelers whose interest lies with smaller airplanes. The .061 once cost more than the Cox* engines and, if the modeler was satisfied with a less-than-ideal throttle arrangement, the price made a difference. Times change! With repeated price increases of the Cox TDs, the G-Mark has become a real bargain.



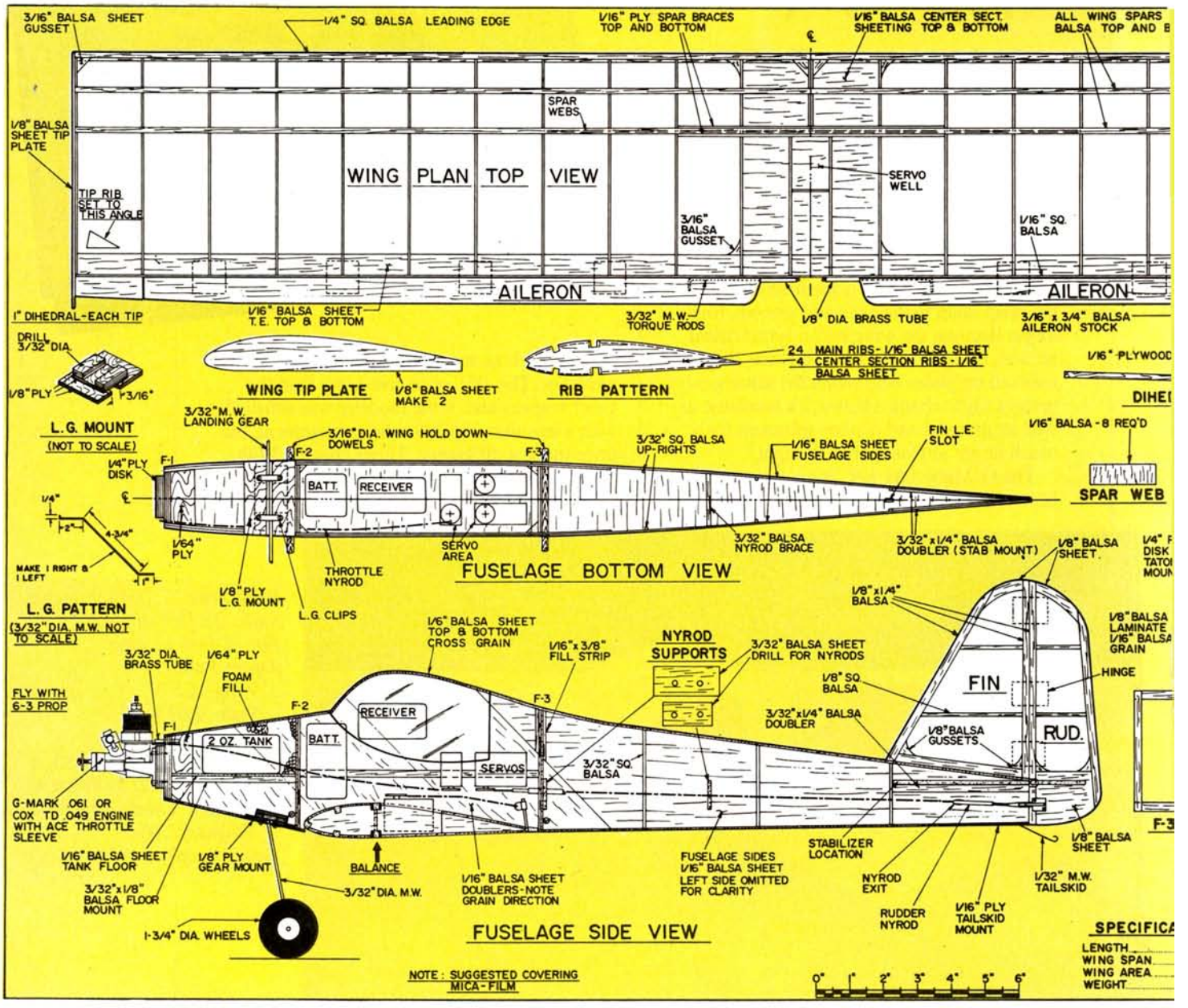
Wing Area: *330 square inches*
Stab: *22.73% of wing*
Fin: *8.41% of wing*
Aspect Ratios:
Wing: *5.87:1*
Stab: *2.61:1*
Fin: *0.96:1*
Wing Loading: *9.16 oz./sq. ft.*
Power Loading: *21.52 lbs./cu. in.*
Volumetric Loading (per Joe Wagner): *.064*
Tail Volume: *.5189*



#4881 G-MAN $9.50

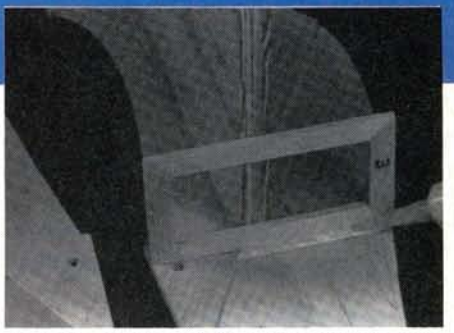
Randy Randolph's latest small-field performer. Uses G-Mark .061 engine for throttle capability. Unique-looking low-wing design features conventional construction with a wing area of 330 square inches and a loading of less than 10 ounces/square foot. Aerobatic yet forgiving.

Not only does the .061 have a throttle that acts like its big brother's (the .60), but it comes with a muffler that works and can be used to supply pressure to the fuel tank for a more even needle-valve setting. This is a well-designed and very well-made engine that reaches its maximum performance with fuel containing only



The wing-mount area of the fuselage showing the location of the landing-gear mount and nyrod anchor plate (just aft of the No. 3 bulkhead). Finished fuselage weighs just under 3 ounces.

An extender is necessary behind the engine mount to allow clearance for the muffler on the G-Mark .061. Note adjustment loop in the throttle pushrod.



A right-triangle made from ½-inch plywood is used as a jig to hold the cabin bulkheads in place while they are glued to the fuselage side.

ten per cent nitro. It must be broken in before revving it to its highest rpm or allowing it a slow idle.

A TD .049-.051 will do the hauling chores as well as the G-Mark will, but without benefit of a good throttle and muffler. Because the TD weighs a little less (no complaints there), move the servos and battery a little closer to the nose so that proper balance can be achieved. Whichever engine is installed, the results will be good!

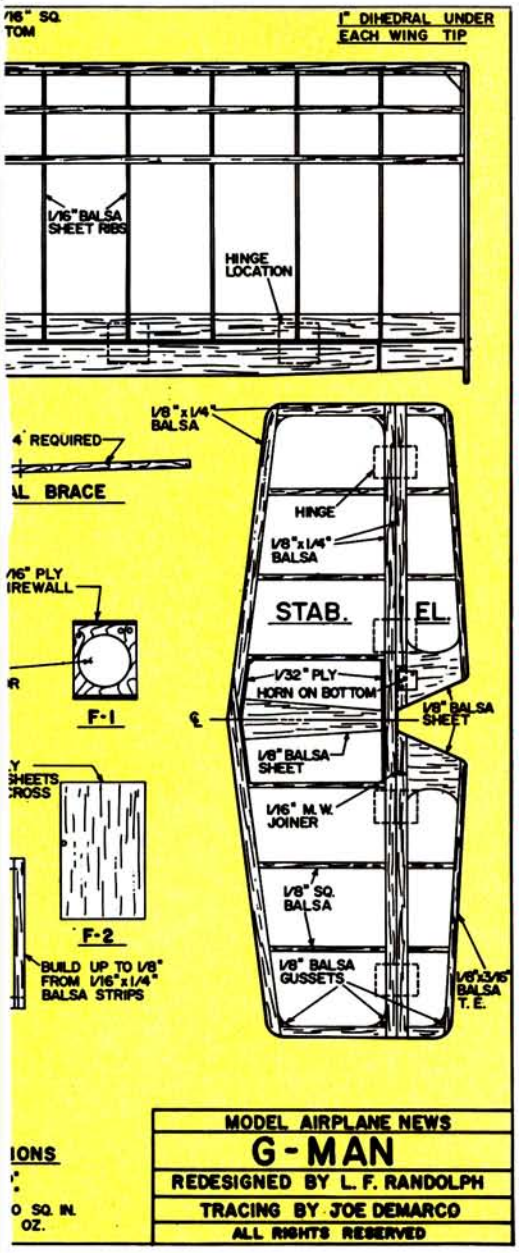
CONSTRUCTION: Wings usually require more preparation prior to construction than other areas do, so that's a good place to start.

The ribs are from 1/16-inch sheet balsa. They can be cut (one at a time) from a printed sheet by tracing around a card stock template with a fiber-tipped pen. You can also make them all at the same time by stacking balsa blanks together, tracing the rib pattern on top and sawing them out with a band saw or a jigsaw.

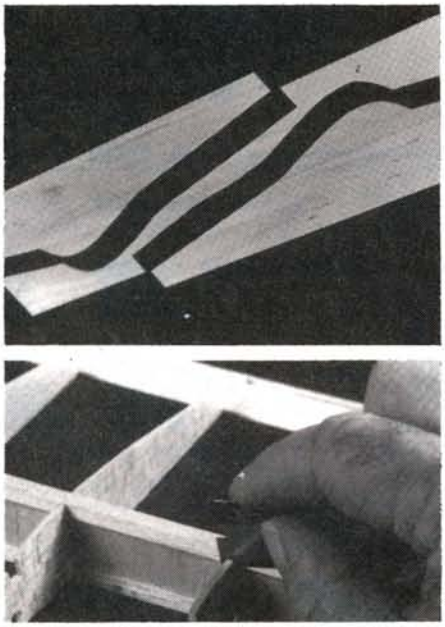
If they're cut from a printed sheet, they should be stacked and pinned together, then sanded to smooth out any irregularities that might crept in during the cutting.

Select four ribs and trim 1/16 inch from the top and bottom of each for the center-section ribs. Cut the spar webbing from 1/16-inch sheet, noticing the grain. Webs add greatly to the strength of the spars but add only a little weight. Spars can be purchased, but the preference is to strip them from the appropriate sheet wood so that weight and strength match. This can be done by using a straight edge and a

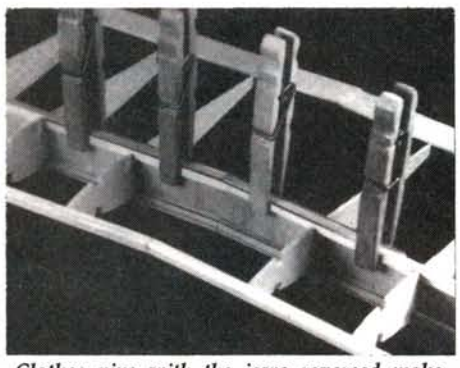
(Continued on page 84)



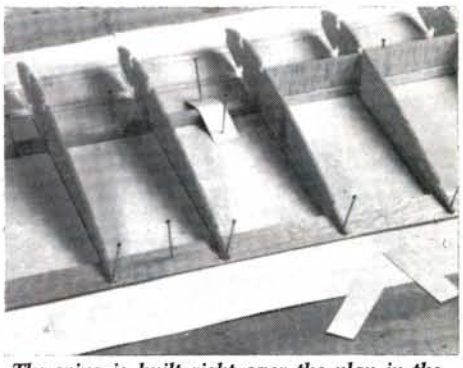
FULL-SIZE PLANS AVAILABLE... SEE PAGE 124.



Top: *Both fuselage sides can be cut from a single sheet of 1/16-inch balsa, 6 inches wide and 36 inches long. Two 3-inch sheets can be edge-glued to form the wider sheet.*
Above: *After the wing is assembled, trim 1/16 inch from the front and back of the center rib notches to receive the dihedral braces.*



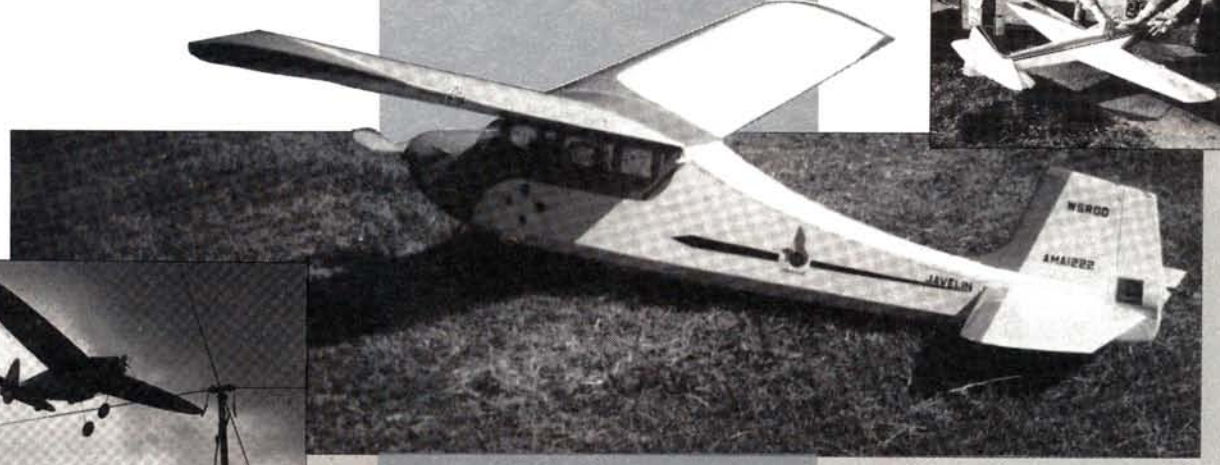
Clothes pins with the jaws reversed make excellent clamps to hold the dihedral braces in place while the glue sets.



The wing is built right over the plan in the time-honored fashion. Hold the spars in place with strips of cardboard, rather than sticking pins through the wood.

OLD TIME RADIO CONTROL

by HAL "PAPPY" deBOLT



Above: *Not all "Antique Class" R/Cs looked like converted free-flights. A good example is this 1941 NATS winner by Jim Walker.*
Right: *Orion with Enya .45, 5¼ pounds. (A. Walker, photo.)*

Top: *Dave Read with Interceptor. Merco .49, 6½ pounds. Dave competed with same design in mid '60s.*
Center: *Along with the well-known "Early-Bird Class" designs, there is an array of "one-offs" like this attractive Javelin by Hank Bourgeois.*
Below: *Steward Foster's Merco-powered Nimbus. Nice finish!*

THE RADIO-CONTROL aircraft is no longer the new kid on the block. After four decades, it's more like a senior citizen. R/C has come of age, and yesterday's dreams have become today's realities. The results can be seen in the variety of model types at the flying fields, some of which could hardly have been imagined just a few years ago.

Along with the technical growth has come a vast influx of people engaged in this exciting phase of model aviation. As would be expected, the desires and abilities of these modelers vary greatly. Some want to stretch the application of R/C to the ultimate, but the vast majority seem content to just build, fly and enjoy without the effort associated with

exploring new frontiers. With *these* R/Cers, club chatter revolves around the completion of a new model or how they can have something different which still suits their modeling styles.

R/C is young enough to still have the hard-core activists who've enjoyed the sport since its inception. In many instances, these are the leaders seen at local and even national levels. They guide newcomers smoothly along what could be a rocky road. They are also the modelers who have the experience and vision to know that what is heralded as *new* today may merely be a change in fashion. If women's fashions regress successfully, then why not R/C trends? Many of yesterday's R/C model designs would be quite at home in today's R/C world. When you're looking for a special, new, unusual and exciting project, why not consider O/T R/C?

I've heard from many modelers who are interested in what happened in the early days. The majority convey their experiences, usually relating stories of the great flying fun they enjoyed with some early model designs. Some inquired about the possibility of building and flying an early design with modern radio equipment. Others say they're still flying some of the *original* models and tell of the interest they create when flying them. Two readers reported on this interest. One flies a Live-Wire Rebel, the other a Royal Rudderbug. Modern R/Cers show enthusiastic interest in these early designs, frequently asking where they can buy the kits!

I also have a report from Alan Walker of Great Britain, who tells of what's been done there with O/T pattern-style designs which are beyond the trainer stage yet docile enough for today's sport flying.

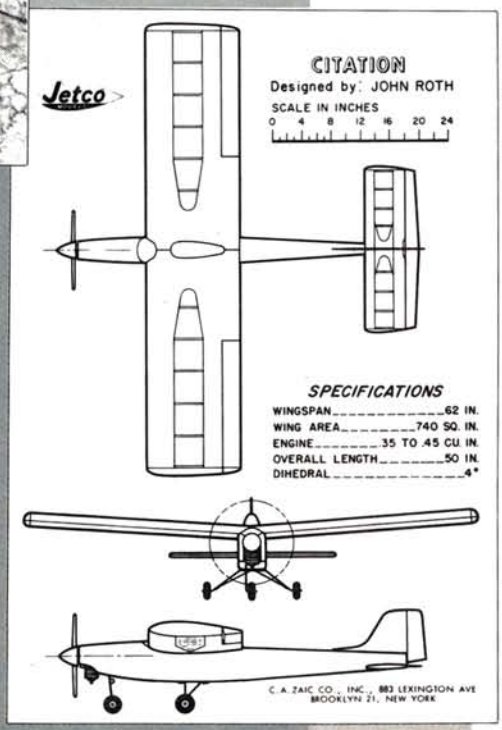
If you're an R/C oldster, you can certainly relate to an after-contest bull session which occurred in England several years ago. A thought was innocently voiced: How would some of the famous pattern designs of the early '60s fare today?

The question was like a bombshell, and it exploded into a lengthy discussion which lasted long into the night.

Surprisingly, something came of it, and the participants concluded that they should schedule a fly-in for vintage pattern designs. The Rolls Royce Flying Club conducted the first of such events in the fall of 1984. The interest shown was greater than anticipated, and about a dozen early pattern designs were flown. To display the still competitive abilities of these craft to the modern world, a semi-formal event was held using the 1961 FAI maneuver schedule. At its conclusion, the judges agreed that the maneuvers seemed even better than they recalled from the actual early '60s' flying! It seems that modern radios brought the abilities of the

Stu Foster fires-up the Merco in his Nimbus. He's a former U.K. World Champ and tough to beat.

Above: *Taurus by Al Walker; Enya 60 FS, 6¼ pounds.*
Left: *Laser 61 installation in Tom Airey's Crusader. (A. Walker, photo).*

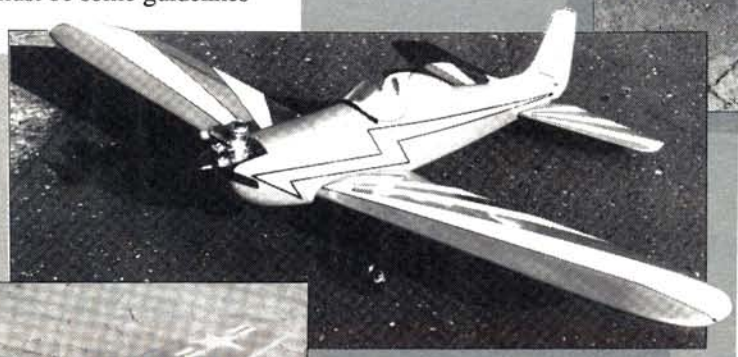


O/Ters' designs up to par with many of the modern offerings.

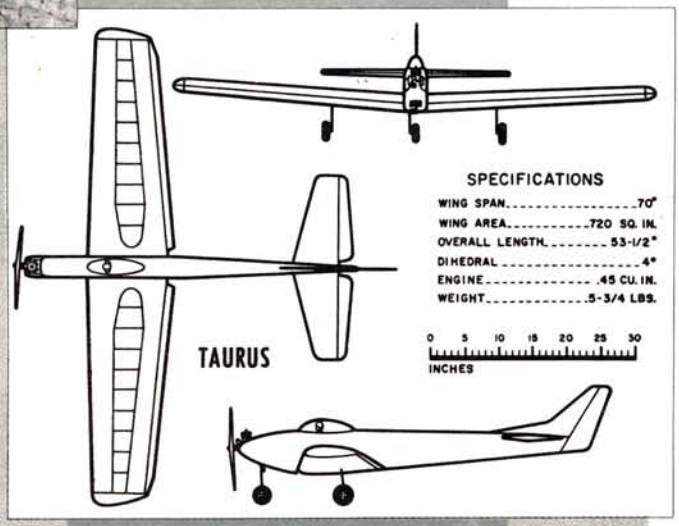
Most of the maneuvers in that 1961 FAI schedule (below the Masters level) wouldn't look out of place at a pattern meet today. Included in the entry list were design names which many will recall from our flight lines twenty-five years ago; names like Orion, Taurus, Astro Hog, Stormer, Crusader and Nimbus. Do any of them bring back fond memories of great flying? As the sun set, the general opinion was that there wasn't a darn thing wrong with these vintage models and that it had been a most relaxing day of pattern flying.

The Vintage Aerobatic movement in England has progressed nicely from this first meeting, and they've scheduled several events each year since then. Naturally, for any event to develop smoothly there must be some guidelines and requirements to establish eligibility as a vintage design. Alan Walker has been the guiding light in this effort, and some reasonable rules have been produced. You'll marvel at the simplicity of the rules, which allow nearly any model of the period to participate. The established cut-off date is December 31, 1963, which might be considered too recent when you realize that the first low-wing contest entries were in 1960. A 1965 design cut-off would open the door to many more interesting designs. This British effort shows us that we Americans may be missing some fine R/C experiences.

There is an excellent precedent for establishing an organized OT R/C movement in the USA. No matter what your R/C interests, you must be aware of the group of modelers popularly known as SAM. This is an old organization of free-flight people with many chapters world-wide. SAM, the "Society of Antique Modelers," began in a fashion similar to the English Vintage Aerobatic effort. It's difficult to understand why SAM hasn't embraced an OT R/C movement; it seems a logical way to expand their group. Perhaps the effort is too much for them. Who needs extra work? They already have an extensive list of activities. Despite this, there seems to be no reason why an OT R/C movement couldn't successfully parallel the SAM effort. Hoping for further developments, I'll throw out some guidelines as others did before me, and I'll see what you all think of them—or *do* about them!



Above and left: *P-63 Bell King Cobra Enya 60 FS; 6¾ pounds by Alan Walker. Maxey Hester design from 1962.*
Center: *Pretty orange, black and white Astro Hog by Mel Plumb; Merco .49, 6½ pounds.*



As the English determined, establishing an OT R/C class is a more complex process than it has been with other modeling categories. This is basically because of the tremendous R/C developments which have led to easier, better and more diversified flying activities. Consider early R/C; it was a major achievement just to fly. Then came reliable radios, which allowed successful flying but little else. Follow these with the multicontrol systems that gave the first real aerobatic capabilities.

(Continued on page 44)

OLD TIME R/C

(Continued from page 41)

Consider aircraft development that has produced the first precise aerobatics and the ability to take part in pylon races. With the advent of proportional radios, the sky's the limit.

I can visualize hard-nosed purists saying that a plane is only an antique if documents show it flew before a certain long-ago date. Many feel that proof such as the word of a designer, dated photos or just plain evidence that a plane is a period model should be sufficient. We would like the greatest possible variety of design to be available for us to enjoy.

It does seem that the only logical way to categorize antique R/C types is by date. Because of the vast differences in performance by the equipment and planes, there should be several categories. Fully aerobatic multicontrol can hardly be compared to single channel, no more than reeds can be to proportional. We could hope that the diversity would be such that no one design would dominate its group. Variety is the spice of modeling.

With history known, it should be possible to use the calendar to classify the categories effectively. Initially, three categories seem plausible: Planes built prior to January 1, 1950, are classified as "antique." Most built before that are single-channel or, at most, Mickey Mouse in nature. Planes in the "early bird" category were built between 1950 and 1955. This was when much of the initial model developments took place. As in England, planes built between 1955 and 1965 are now "vintage" aircraft having low wings and aerobatic capabilities.

If you want to classify the possible model designs by their age and flying ability, what would some of the popular choices be in each category? In the antique class ('50s), likely choices are plentiful; consider Dr. Good's "Guff," Lanzo's Notes Champ and RC-1; Walker had a couple; Weis and Seigfried had universal designs and the Shereshaw RH-1 was a beaut. Berkeley Models had several in kit form—Buccaneer, Brigadier and Custom Cavalier head the list, and there are numerous lesser-known types to whet your appetite.

The early-bird category would open the door really wide. This period saw the birth of the basics of modern R/C design. Begin with the Rudder Bug, Trixter Beam, Mambo, Hi-Q, West Coaster (Bonner had one) and add to these the numerous Live Wires, Seniors, Trainers, Cruisers, Champs, Kittens as well as deBolt's "Over and Under" and "Equalizer." There were even more one-off attractive designs to swell that list. This period took several steps toward modern structure, improved flying ability and realistic maneuvering capability.

The vintage period (from '55 to '65) may separate the successful multicontrol craft from the others. The fine low-wing design would dominate this section, as intended, but there were other attractive types. Start with the Smog Hog, LW custom bipe, Sonic Cruiser and Root's Ascender and then consider the numerous similar designs. Once into the low wings, the possible list seems endless, and most would appear at home on today's flight line. How about the Astro Hog, Orion, Taurus, Dunham Voltswagon, Bretts Nimbus, deBolt's Crusader, FAI Bipe, Playboy, Craft's "Quick-Fli," Nelson's Sultan, the Live Wire, Pursuit, Cosmic Wind and Viscount? This is a short list which could be greatly expanded.

As the English proved, most of these

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OLD TIME R/C

(Continued from page 44)

vintage craft have a modern appearance and good maneuverability. In general, they used less power than today's planes, so flight was more docile and probably would be attractive to today's average flyers. The model designs suggested here were dated from memory only; some research would be necessary to establish an official list with the probable additions.

Modern engines are much more powerful than the old ones. For an OT R/C movement to require the use of original-type engines would be unrealistic. It is suggested that the engine used should fall within the displacement range recommended by the designer.

Also, if OT R/C is to be attractive to all R/Cers, it's stupid to handicap ourselves by using anything but the finest equipment we have. So there should be no restrictions on R/C equipment.

With the exception of the antique category, the other classes would use modern construction methods. Following the original methods could be desirable but not mandatory. This is especially so with covering, as today's films are so appealing. We would address purists by saying that there is nothing in the regulations preventing them from doing their thing. Simple, rather than complicated, regulations will attract more modelers and increase the popularity of OT R/C. The purist can expect that his effort will be even more admired as a result.

Many individuals are now flying OT R/C planes of one form or another. Through an established headquarters, these could set up an organization and then invite others to join them. The advantage of an OT R/C organization is that it would allow many people of similar interests to exchange ideas. An OT R/C newsletter would be a good idea too.

Certainly, low-key OT R/C fly-ins would be of interest to general modelers also. Here would be a chance to *see* our heritage, instead of just reading about it! As in England, semi-official competitions could be added, using AMA rules for each category. Every flying session would be an informal competition to see who is outstanding on that day.

So there you are, OT R/C is completely possible. Interested? ■

Engine Review

by PETER CHINN

THE SECOND OF K&B'S OFFERINGS FOR THE SPORTMODELER, AIMED DIRECTLY AT THE MOST POPULAR-SIZE MARKET.

K&B's sturdy, good-looking 45 Sportster offers remarkably good value.

K&B .45 SPORTSTER

SPECIFICATIONS

Type: Air-cooled, single-cylinder, side-exhaust, 2-stroke cycle with crankshaft rotary-valve and Schneurle scavenging.
Bore: 0.850 inch (21.59mm)
Stroke: 0.800 inch (20.32mm)
Displacement: 0.4540 cubic inches (7.439cc)
Nominal Compression Ratio (full stroke): 11.0:1
Speed Control: K&B barrel-throttle carburetor with adjustable automatic mixture control.
Checked Weights: 13 ounces (369gm) bare; 15.9 ounces (450gm) with muffler; 16.2 ounces (459gm) with muffler and firewall mount.
Mounting Dimensions:
Crankcase Width: 1.42 inches
Height Above CL: 2.86 inches
Length From Prop Driver: 3.44 inches
As Above, Plus Firewall Mount: 3.82 inches
Bolt-hole Spacing (beam): 1.687 x 0.812 inches
Bolt-circle Radius (firewall): 1.25 inches
Manufacturer's Claimed Power Output: Not stated. See text.
Manufacturer: K&B Manufacturing Inc., 12152 South Woodruff Avenue, Downey, CA 90241.

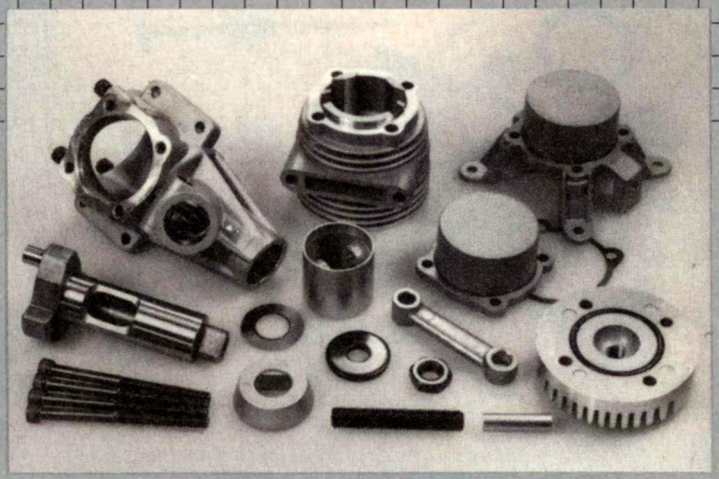
ENGINE BUFFS WILL HAVE no difficulty recognizing this recently introduced K&B motor as a scaled-up version of the K&B 20 Sportster that we dealt with in the December '86 issue of *MAN*. At that time, K&B had just completed forty years as a model engine manufacturer and, as an introduction to the 20 Sportster, I commented very briefly on the company's beginnings.

The new 45 brings to mind another milestone in K&B's history: their very first .45-size engine, the Torpedo 45, which was introduced in early 1959. This was the largest engine that K&B had produced up to that time. Thirty years ago, reliable multi-channel radio-control equipment had just become available commercially. It enabled R/C models to follow full-size practice by using rudder, elevators, ailerons and fully variable engine speed to control the flight. Before this, most radio-control sets only provided rudder-only control, although sometimes with the option of a limited control of engine speed. In the middle and late '50s, the new horizons opened up by multi-channel control (as demonstrated by people like Hal deBolt and Howard Bonner) led to the development of more powerful models. Engine sizes went up from the .19 cubic inch displacement previously used, to around .35 cubic inch. For example, Bob Dunham used a Fox 35 in Bonner's famous Smog Hog to win the 1957 U.S. Nationals R/C Multi event, and he was just half a point ahead of deBolt's K&B Torpedo 35-powered Live-Wire bipe. In 1958, it was Dunham again, now with a modified version of Fred Dunn's pioneer low-wing Astro Hog, equipped with a K&B 35. However, top multi-channel flyers were looking for even more power, and the Torpedo 45 that followed a few months later was K&B's timely response to this demand.

I have both a Torpedo 35 and a 45—the latter being the actual engine that was featured in the *MAN* "Engine Review" test article for September 1959! These Torpedo models are almost identical in appearance and overall dimensions; the

45 was basically a stretched version of the 35. Cylinder bore was increased from 0.790 inch to 0.840 inch, and piston stroke was lengthened from 0.720 inch to 0.820 inch, thus enlarging the engine from 0.3529 cubic inch to 0.4544 cubic inch. Naturally, an increase in displacement of nearly 29 per cent within approximately the same mass could be expected to increase vibration levels and, with the object of dealing with this, the 45 was equipped with a device which K&B called a rear counterbalancing flywheel or RCF. This was a molded nylon rotor to which was keyed a die-cast bobweight of zinc alloy. The whole thing was mounted on a steel pin pressed into a boss in the crankcase backplate and was driven by the crankpin.

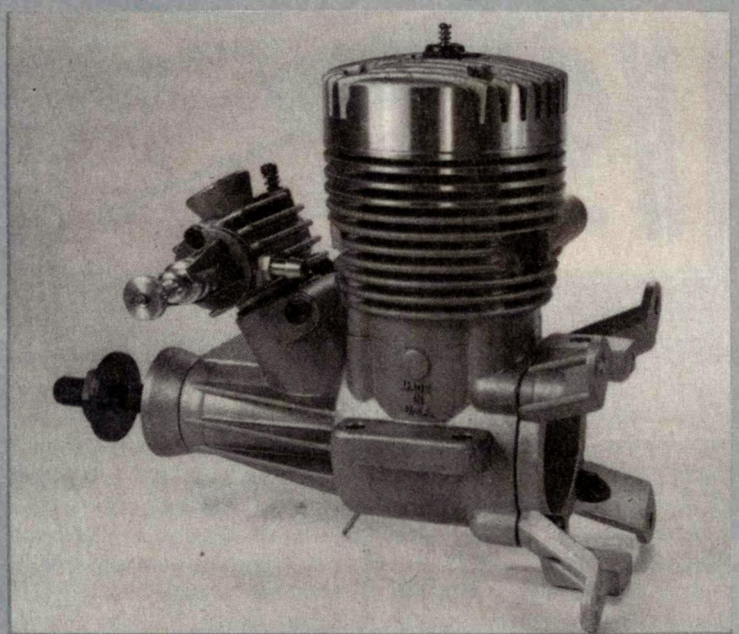
Typical of the K&B Torpedo range at that time, the 45 was a plain (bushed) bearing engine with shaft rotary valve, crossflow scavenging and a ringless, cast-iron (Meehanite) piston running in a steel cylinder and having integral cooling fins. The carburetor was a simple barrel-throttle type with no provision for adjusting the idle-mixture strength. Instead, the upper opening of the throttle barrel had a small notch that prevented excess suction being created at the jet and the mixture becoming excessively rich when the throttle was closed.



Parts of the 45 Sportster. Note unique one-piece cylinder and chromed, ringless, aluminum piston.

The Torpedo 45 weighed fractionally over 9 ounces and, on testing, our example produced just over 0.60 brake-horsepower at 12,000rpm.

On paper, the new K&B 45 Sportster seems to have some features in common with its ancestor as it, too, is a plain, bearing motor with a crankshaft induction and a ringless piston. However, side-by-side comparison of the engines provides a startling illustration of just how far K&B development has progressed.



Also supplied, at no extra cost, is a backplate spider-mount that incorporates lugs for a steerable nosewheel.

First, the new engine is substantially larger and more solid. The Sportster is taller, wider and about an inch longer, and it's no surprise that it's 43 per cent heavier than the 1959 engine. Hefty external appearance is matched by equally sturdy internal proportions. For example, whereas the Torpedo had a 7/16 inch (11.1mm) diameter crankshaft journal, the Sportster has a 19/32-inch (15.0mm) journal

Such increases in bulk and weight might be less acceptable if they weren't accompanied by increased performance. In fact, being a much more modern design, the Sportster is capable of developing almost twice the power of the Torpedo 45.

As already mentioned, in design and construction the 45 Sportster is closely modeled on the 20 Sportster. The engine is, of course, of the Schneurle-scavenged type, and this is combined with a form of construction that eliminates the need for a separate cylinder liner. The cylinder is cast in one of the special high-duty aluminum alloys, which have been developed recently for full-size internal combustion engines and combine a low coefficient of friction with exceptional durability.

These properties are also exploited by the choice of similar material for the crankcase where it's been possible to dispense with a bronze main-bearing bush. The large diameter of the crankshaft journal means that the actual wall thickness of the bearing is surprisingly modest.

Parts of the K&B automix carb. Mixture-control valve (left, foreground) is adjusted by means of adjacent eccentric-headed screw.

However, the crankcase nose is strongly braced by no less than three triangular webs on each side, plus the usual stiffening above and below, including a heftily proportioned intake boss of 13.5mm i.d. and 19mm o.d. The hardened-steel crankshaft has an integral, 5.5mm-diameter solid crankpin on a T-type crankweb and features a separate screw-in ¼-28 prop stud.

To provide a suitably hard surface for use with the special aluminum cylinder bore, the ringless aluminum piston is chromium plated. It has a blind wristpin hole at the front so that the 0.204-inch o.d. wristpin requires an anti-scuff pad at the rear end only. The connecting rod is unbushed and is 1.375 inches (1.72 x stroke) between centers.

Cylinder porting consists of an unbridged exhaust port on the right, flanked on each side by twin, Schneurle flute-type inlet ports angled to direct gas flow away from the exhaust and toward the opposite side of the cylinder where it's directed upward by the flow from a wide third port. The cylinder casting and machining are finely executed and provide accurately aligned and smoothly contoured ports. Checked timing of the engine revealed an orthodox 142-degree exhaust period, but with the third port opening 4 degrees before the 120-degree period of the four main inlet flutes. The rotary valve checked out at a conservative 175-degree induction period, closing at 40 degrees ATDC.

As with the 20 Sportster, the pressure-cast cylinder head is separated from the cylinder by a partially recessed heatproof O-ring, rather than by a conventional metal or composition gasket. The head has a deep, partly spherical combustion chamber which is surrounded by a 4.3mm-wide flat squish band. Four long 6-40 cap-head screws pass through the head and cylinder block to tie the complete assembly to the crankcase.

The carburetor is a larger version of K&B's efficient, adjustable automatic mixture-control-type used by the 20 Sportster. The details of this were included in our review of the 20 and so won't be repeated here.

As with the smaller engine, the 45 comes with an effective muffler. This contains three baffle plates and a perforated central tube through which the exhaust gases are passed from one chamber to the next. This enables them to expand and cool before being released through the angled outlet stub at the rear.

Also continuing the fashion established with the 20 model, the 45 includes a special crankcase backplate that can be interchanged with the regular backplate. The optional backplate incorporates a spider-type radial mount that enables the engine to be bolted to a firewall instead of to the usual horizontal mounting beams. It also incorporates a pair of drilled lugs for installing a steerable landing-gear nose-leg.

The K&B factory quotes typical rpm figures—when using K&B 500 (12 per cent nitromethane) fuel and a 10 x 6 prop—of 13,200rpm and an idling speed of 2,500. These figures, confirmed by independent checks, are a good indication of the 45's potential.

Muffler parts. Perforated central tube with baffles provides better noise suppression than conventional expansion chamber.

The one thing I haven't mentioned is the cost of the engine. Here, K&B has pulled the biggest surprise of all, as the 45 Sportster, complete with muffler, glow-plug (not supplied with some imported engines) and optional radial mount, is now just about the lowest-priced .45-size R/C engine on the market. Moreover, this includes a guarantee covering engine failure caused by defective materials or workmanship "for the life of the engine."

The K&B 45 Sportster looks like a pretty good deal. ■

Giant Steps

by DICK PHILLIPS

Modeler, Chuck Felton, with his cardboard SPAD. Easy technique.

THOSE OF YOU who are regular readers will know that I'm a great believer in the use of substitute materials. I've used a number of substitutes myself and have had some good (and economical) results over the years. The use of substitute materials can reduce the high cost of building large models and keep you within the limits of your budget.

You can read all about the substitutes I've used over the years in my book, "Building Big is Beautiful," so I won't go into them here.

Some time ago, I received a letter from a young man in New York state who had built and flown a Fokker DVIII made from corrugated cardboard, which I've also used occasionally. The Fokker was flown successfully over a summer from a rough field. In addition, the builder was making the model in quantity and was selling a kit for it.

I recently had a similar letter from Chuck Felton, of Compton, CA. Chuck has been building with cardboard for some time and sent along some photos of the results. His response had been triggered by some comments I made in my August '87 column about the use of foam core in model construction. I said that I wouldn't use the foam core in model construction and also that I wouldn't use it in any situation where it would have to bear loads. Chuck tells me that his creations are almost exclusively cardboard, and that he uses it in all locations. Chuck says he uses balsa and plywood, but only at firewall and gear-mounting locations (surely a good move).

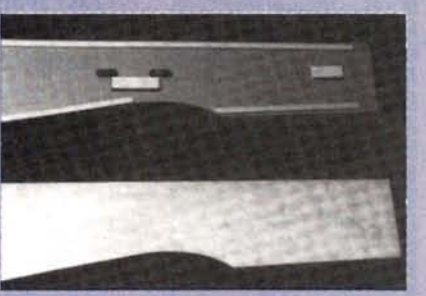
Chuck uses some interesting construction methods. For example, his empennage members are made of two thicknesses of 1/8-inch cardboard glued together and then edged with easily shaped balsa strips. Note that he laminates the cardboard pieces with the "grains" running at right angles to one another. This "grain" is actually the lie of the flutes in the center of the cardboard. Laying them at right angles would certainly add a good deal of strength to the finished model.

Chuck doesn't say what he uses to glue the plys of cardboard together, but one of his photos shows a jar of Titebond. I guess that ordinary contact cement would also do a good solid job on such a joint.

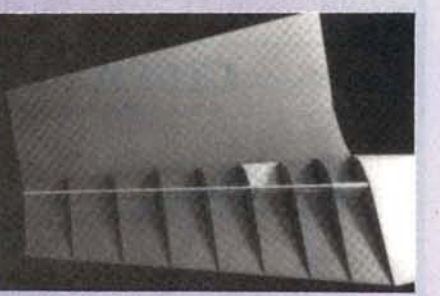
The material Chuck is using appears to have a very good surface for finishing. He paints the cardboard so that no covering is required. Such material should be available from box factories or from the manufacturers of the material. I doubt that used boxes would be good enough.

As I recall from my own use of the material, you should use "B" flute material

Cutting and scoring for bend lines is easily accomplished using straight-edge and wall-papering tools.



Cardboard fuselage sides use wood (balsa or spruce) for reinforcement or attaching points.



Wing skins and ribs from cardboard. Wood used for spars, joiners and landing-gear mounts. Upper skin scored to ease matching upper camber.

Next You Might Even Be Able To Use The Box The Kit Came In!

that has a finer fluting between the outer layers. This makes for a stiffer material. In addition, choose a cardboard which has a good painting surface. Corrugated cardboard, like most materials, comes in a variety of grades and qualities. Choose the best quality you can find. No matter what it costs, it won't be nearly as expensive as a similar quantity of balsa!

Considering that the tail members are edged with balsa stock, hinging shouldn't be a problem and could be done in the same way as on an all-wood model.

As you can see from the photos, Chuck uses a single sheet of cardboard to make a wing. Once the outer covering is cut to shape, the internal structure is glued in place and the upper covering is glued down on top of the ribs and spar. Note that the tool with the wheels on each end is a tool used to score the cardboard so that it will take a nice, smooth curve. Of course, this scoring is done on the inside surface. A gentle touch here will permit easy curving of the cardboard without having the scoring show on the outer surface.

While a constant-chord wing would be the easiest to lay out, some pretty sophisticated shapes can be made if care is taken in doing the original layout on the cardboard accurately.

Chuck's photos show the methods he uses to build his models from this material. It's obvious that he has planned well and that he has mastered this unusual technique. Several of Chuck's models have graced the pages of this magazine; notably a Curtiss Robin in the August '77 issue, a Junkers D1 in October '78, an SE-5a in April '79, a Bf-109 in February '80 and a Dewoitine 520 in September '83.

If you're inclined to try something new, you can't go far wrong giving Chuck's ideas a run. Even if you make a mess of it, you won't be wasting a lot of expensive material. First-time users of the material should stay with the KISS principle—Keep it simple, Stupid! A slab-sided model would make a good starting place and, if you like what results, there's plenty of time later to get into the more sophisticated, complex models. Keep me in touch with your efforts; I'm very much interested in how this sort of thing works out for others.

There are any number of other materials which can be used in the hobby and, as I've suggested in the past, the model builder who goes around with his eyes open and his imagination unfettered frequently finds something quite common that can solve a problem for him. Being imaginative in your use of substitute materials can open up entirely new areas for you, as it has for Chuck Felton and many other modelers.

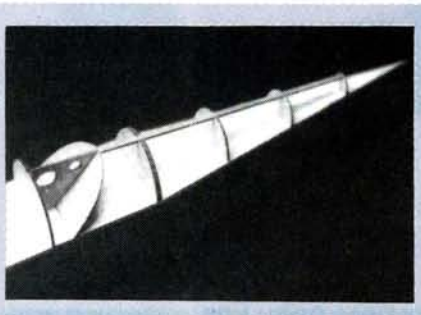
Despite claims that the building of large models was a fad which would quickly disappear, nothing has been further from the truth. This claim was made almost ten years ago when I built my first biggie, and it still continues to crop up from time to time. Sure is strange that so many are unable to see the abundant signs which indicate that the larger model is alive and well.

Most contests these days are dominated by large models. Even the prestigious Masters contests around the country tend to be dominated by giant-scale planes.

The reasons for this continued popularity are obvious to those of us who fly big models: They're much more scale-like and realistic, both on the ground and in the air. They're often much easier to fly than the smaller version of the same airplane. Just getting a better wing loading (especially on a scale model) makes for a model which handles better. It's also easier to arrange scale detailing on the larger sizes.

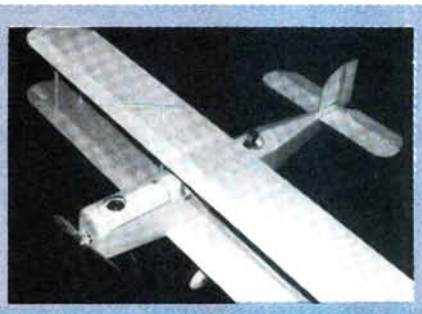
The proliferation of plans, engines and accessories for the large model suggests that manufacturers and suppliers are convinced of the longevity of the ¼-scale (and larger) models. These people don't invest a lot of money in design, tooling

(Continued on page 85)



Only wood here is stringer; everything else (including formers) is cardboard.

Area forward of cockpit is sheeted with scored cardboard. Lots of ingenuity here.



Nearly completed bipe awaits edge-finishing and paint.

HOW IS SMALL Small?

Article and Photos by BUDD DAVISSON

Pazmany PL-4A uses belt-driven VW engine. Weighs 578 pounds for a 9.5 pound/square foot loading.

LITTLE REAL AIRPLANES OR JUST BIG MODELS?

IN TALKING ABOUT BUILDING "small" airplanes (whether built to carry a man or a handful of servos), there are certain laws of physics and aerodynamics which apply. One of these is that "small" is a relative term. Gulliver thought he was average until a herd of Lilliputians judged him otherwise. But, put him in with some NBA regulars, and *he'll* be the Lilliputian. It's all relative, and it works just the same with airplanes.

To a 747 pilot, a Cessna 172 is tiny ("What do you mean, I don't get a Danish with my coffee before the approach?"), and the C-172 driver is going to think that a Pitts is absolutely minuscule. ("Okay, it's cute, but what do you do with it?")

The size of an object is judged relative to other objects. For instance, the difference between a .40-size model and a .60-size model is only a couple of feet, and they are judged alongside each other. However, with a 10-foot model, the guy holding it seems to shrink; *he* is the measuring stick, not other models. Ditto, for real airplanes.

A Cherokee is smaller than a C-172, but both are the same in relation to their pilots. However, a two-place Pitts looks a "normal" size when measured by its pilot yardstick,

while its single-place brother shrinks considerably when the same pilot walks up to it.

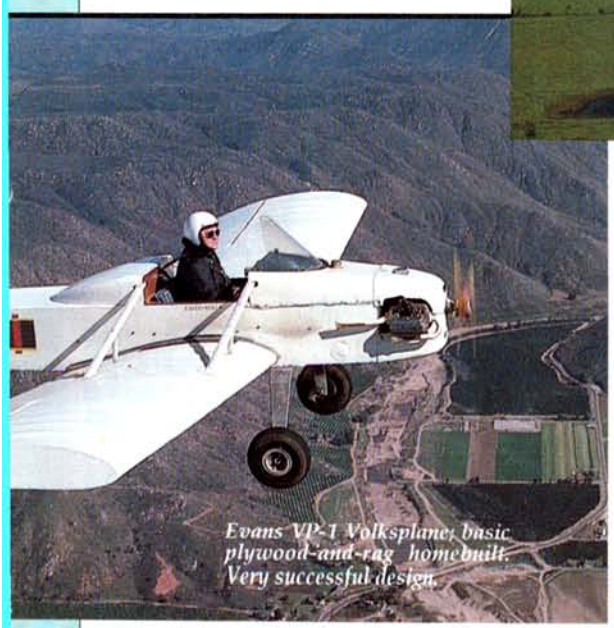
The laws of physics and aerodynamics are absolute, and they become more and more critical with smaller machines because the effect of changes is so much more easily measured.

A great illustration of this "small-airplane effect" is the aforementioned two-place Pitts. With one person aboard, it's a tiger, but with two it's tamed to a pussy-cat level. On the other hand, a C-172 hardly feels the effect of a second person climbing on board, but the single-place Pitts *really* notices a second person.

There are all sorts of rule-of-thumb measurements that determine the general flying characteristics of an airplane, and they're more critical with smaller airplanes. The most common measurements are: aspect ratio, wing loading and power loading. Span loading is also important but is seldom mentioned.

Smith Miniplane has 17-foot span. This one in pre-WWII markings is attractive.

Davis V-tails typify early, small, homebuilt movement. Design goes back to 1966.



Evans VP-1 Volksplane; basic plywood-and-rag homebuilt. Very successful design.

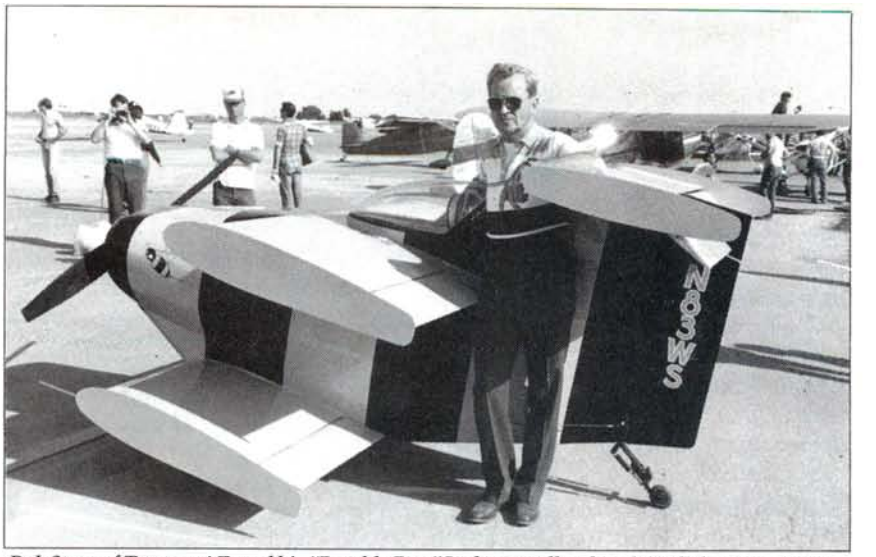
Mathematically, the aspect ratio is basically the span measurement divided by the mean aerodynamic chord and, the higher the number, the more effective the wing. In other words, the longer or skinnier the wing, the more it will lift. (That's a gross generality, but close enough.) The higher aspect ratios give more lift and slower speeds and therefore require less horsepower to get up and going. Gliders are the quintessential examples of high-aspect ratio; they may run in the range of 20 and over.

However, high-lift, high-AR wings are cursed with the always-present aerodynamic trade-off of "induced drag." If you generate a lot of lift at low speeds, the drag induced is high and limits the airplane's speed. That's why many racers have stubby little wings; they have the horsepower and don't want the drag, but watch them come in to land! The trade-off at the lower end is obvious.

Wing loading is the number of pounds per square foot (or, on a model, ounces per square inch) a wing is carrying. If you have 100 square feet of wing and your weight is 1,000 pounds (you'd really be funny-looking!), then the wing loading is 10 pounds per square foot—about the same as a lightly loaded C-172. You don't need a degree in astrophysics to know that the more weight a square foot carries, the harder the wing will have to work to keep the plane in the air.

All things being equal, a higher wing loading means a higher stall speed, more power required to climb and higher approach and landing speeds. But don't think that high wing loadings are necessarily bad and that light ones are good. There isn't anything in aerodynamics that's as black and white as that. Aeronautic life is a chain of compromises, and this is one of the first areas for compromise.

A plane with a low wing loading takes less horsepower to fly but, because it's light, it may be harder to control in gusty conditions. For example, a Taylorcraft stalls at around 35mph, but a Mustang stalls at 85mph (with flaps). The Taylorcraft's 8- to 9-pound per square foot wing with its high-aspect ratio enables it to come wafting down finally at 50mph. The Mustang's 33- to 35-pound per square foot wing means that the smart driver keeps 110 to 120mph as a minimum over the fence and probably has a fistful of power on at the same time. But the Mustang won't even notice a strong wind that would be nearly impossible to land a Taylorcraft in. It will chop through the bumps and thermals, while the less heavily loaded Taylorcraft will bob around like a cork, riding over all the bumps.



Bob Starr of Tucson, AZ, and his "Bumble Bee." Inches smaller than Stits' below. (Jack Cox Photo.)

At the other end, the more heavily loaded wing needs more power to accelerate to the speed needed to generate enough lift to fly, and even more power is needed to give a decent climb. The Taylorcraft is off in 300 feet and climbing 500 feet per minute on 65hp, while the Mustang uses 20 times that amount of power to climb only five times faster and also uses eight to ten times as much runway. Of course, when the noses are lowered to the horizon, the payoff for the wing loading, power loading, etc., is in the Mustang's favor.

There's nothing I've said here that can't be directly applied to models; aerodynamics works for everything that flies (or tries to!). The designer usually aims for a cross-over point in which enough wing loading is used to give some control in moderate winds and enough power is used to generate a useful climb with a normal-size wing.

With a small model, the equation is skewed in favor of light wing loadings, and a builder must accept that it's his fate to fly early in the morning and late in the afternoon, after the wind has died down.

The operative word here is "light." Don't put it on the airplane if it isn't really needed. Most extra weight in both full-scale and model airplanes is non-structural. The superslick fairings have too much filler, and the cowling is ¼ inch thick. The screws are oversize and too long, and four stringers are used where three would do.

Then there's the paint. So much effort is put into producing an ultra-slick finish that looks as though it's an inch thick (because it *is* an inch thick) that the modeler forgets that the machine was built to fly, not just to look at. On a small airplane like a two-place Pitts, it's entirely possible for the finish alone to weigh close to 100 pounds—and that's on a 1,500-pound airplane!

Tom Cassutt (designer of the little speedster that bears his name) said it best: "If you're wondering if a component is too heavy, lay it on the table. If it doesn't float to the ceiling, then it's too heavy." In short, any weight is too much. Whether you have a 90hp Smith Miniplane, a 40hp Avid Flyer, a .60 Laser or ⅓-scale Pitts, the laws of physics can't be bent for anybody—not even a modeler.

Ray Stits' Sky Baby. Ken Willard did a ¼-scale version.. less than 2-foot wingspan!!

MICRO LASER

(Continued from page 15)

many good, small radios available, and they're all very lightweight and reliable. Although somewhat on the expensive side, they're well worth the cost.

A further consideration for a small model is the powerplant. There isn't much choice here; it's either the Cox .02 or the G-Mark .03. I've had good results with both engines, but careful break-in and tuning is required to achieve full power.

The design presented here is the fruition of my attempts to produce a small plane with good flying ability (including aerobatic capabilities) and a true, scale likeness to its full-scale big brother.

Because of its small size, this model requires special care and a good deal of attention to detail when building and finishing. If you have patience and skill, you'll end up with your own unique model Laser; a real show-stopper which will stand out from the crowd because of its size.

CONSTRUCTION: • The Fuselage. Beginning with the bottom and side pieces, accurately mark off the positions of all the formers and other internal pieces. Pin the fuse bottom down to the building board. Using former C as a brace, position the fuse sides and glue them to the fuse bottom. Now glue former C into place, making sure that it's lined up with all of the location marks you made. Glue the fuse sides together at the tail. Prepare former A by gluing on the 1/8-inch square stock where indicated on the section drawing. These strips will help locate the former when it's glued to the fuse sides and floor. Slip former A into place and glue it very securely.

Next, glue all six of the fuselage stringers into place. (There are two stringers on the fuse bottom and two on each fuse side.) All stringers are now sanded to taper towards the rear of the fuselage.

Now attach the outside doublers to the fuse sides between the upper and lower stringers. Next, glue the two inside fuse doublers in place. Install formers B, D and E. Now cut out all of the lightening (weight-reducing) holes in the fuse sides and bottom. The turtle deck is now sheeted with strips of 1/32-inch balsa. A lightweight filler material may be used to cover any gaps or imperfections.

Prepare to attach the tail surfaces by carving the two filler blocks which follow the contour of the turtle deck. A 3/32-inch spacing shim must be added to the top rear of the fuselage in order to get the stab in the correct location.

Use a solid block to form the hatch, carving it to the proper fit and contour. A small, clear canopy was purchased from the local hobby shop and trimmed to size. Hollow out the underside of the hatch to save weight.

• Tail surfaces. There's nothing difficult here. Just frame up the fin, stab and elevator directly over the plan using the sizes of wood indicated. Note that there's no rudder; just a one-piece fin. Be sure to sand everything smooth and to round off all the outer edges. The leading edge of the elevator should be beveled to a sharp edge for hinging. Now glue the stab squarely in place at the rear of the fuse. Glue on the two filler blocks, leaving a slot for the fin. Note that the fin must be installed after the elevator is covered and hinged to the stab.

• Building the wing. Use the same procedure to build each wing, being sure to build one right and one left. First, pin down the bottom main spar along with the leading edge and the rear spar. Starting with the tip rib and working toward the

(Continued on page 62)

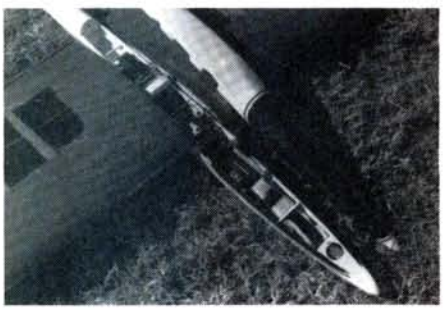
Quiet Flight

by JOHN LUPPERGER

George Ritter, caught at the most critical moment in any model's life—the very first launch. The orginal-design Starship is striking in appearance and shows good performance potential.

NOW, AS I WRITE THIS in early January, I realize how lucky we glider guiders in Southern California are. The biggest item on tonight's news was about the Arctic storm that's hitting most of the U.S. Don't get me wrong; it does get rather cold here. Recently, we actually wore coats at the flying field, and we were only able to get down to sweaters and light jackets at noon. I find it hard to imagine flying in the conditions endured by some parts of the country: heavy snows, high winds and chill factors in the minus degrees.

At least the guys back East have a building season. It seems as though we do so much flying (and subsequent repairing) in Southern California that we don't have enough time for serious building. Every time I get a new plane nearly finished, it seems very important to have it ready to fly "this weekend." Because of this, I think that the final phases of finishing are often rushed. I'm sure that those who have a snowy winter in which to build their next contest ships probably finish and bench-trim them completely before the planes ever see a winch or a high start. However, I still think I'd rather have a year-long flying season!



Radio installation in the Starship is straightforward although a bit tight. Fuselage is reinforced inside and out with Kevlar fiberglass.

Fiesta SF Revisited

In the September 1987 issue of *MAN*, I reviewed the Multiplex Fiesta SF. This 128-inch span, high-performance thermal glider has a rather unusual feature. The full-flying stabs have a flat-bottom airfoil, and this gives the model some rather strange flight characteristics. No matter where I located the CG, the model flew as though it were balanced on a teeter totter. It was always pitch-sensitive and somewhat difficult to fly at high speeds. When bringing the model down quickly, the increase in airspeed caused the tail to produce more lift. This, in turn, would push the nose down even more, so further increasing the airspeed. Eventually, this could lead to "tuck under," a condition which can seriously stress airframes. I was rather disturbed by this as, apart from this problem, the model seemed to show great potential. I didn't fly the model very often.

At an electric contest, I ran into Brian Chan of San Diego, CA, and he had a suggestion. Brian had read my review, and said that he was a Fiesta owner who had solved the problem. He told me that he had simply flipped the stabs over, and that this brought about an amazing transformation in the Fiesta's flight characteristics.

I dug my Fiesta out of the rafters and gave it a try. Flat side up, curve on the bottom, a few ounces of lead in the nose and off to the field. What a difference! It was as though I had thrown out the old Fiesta and been given a new, high-performance sailplane. Everything about the ship had changed. It was easier to launch, it was steadier in turns, pitch control was smooth and positive and, most important, the L/D (lift/drag) improved quite a lot. I've decided to make the Fiesta my contest ship for '88.

Most unusual features of the Starship are all located at the wing tips. Winglets, tip spoilers and elliptical dihedral certainly give it a distinctive character that removes it from the everyday polyhedral-type of glider.

The down force of the inverted stabs gave the Fiesta the stabilizing force it

Your author with his hand-launch and electric BODST models. The only difference between the two is a ½-inch wider fuselage on the electric version.

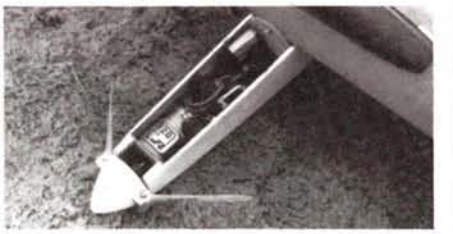
needed to bring the wing under control. Another advantage is that no up-elevator (or decalage, i.e., incidence between the wing and stab) trim is needed, as would be the case with a symmetrical tail. This seems to improve the models' L/D, probably owing to lower drag. The only disadvantage I've encountered so far is that, in a high-speed dive, pitch control is a bit ragged. If you have any comments, or have had a similar experience, write and share it with the rest of us.

Model of the Month

This month's model comes to us from George Ritter of Palm Springs, CA, who is an architect and designs most of the models he flies. His latest design is known as the Starship. The model has a wingspan of 128 inches, a wing area of 1,250 square inches and a flying weight of 92 ounces, for a wing loading of 10.6 ounces to the square foot. The fuselage is conventional balsa and ply that is heavily beefed-up with Kevlar, both inside and out. The wing uses the Epler 193 airfoil and is a conventional built-up structure with 6 per cent flat-bottom winglets. The model is controlled with an Airtronics* single-stick, 7-channel radio on rudder, elevator, spoilers and tip spoilers (with rudder).

Its most unusual features are the tip spoilers and the elliptical dihedral. Although the elliptical dihedral is difficult to build, George felt it was worth the effort for the aerodynamic advantages. The wing is rather flat through the center section with most of the dihedral in the tips. To make sure that the model would turn well, George designed and installed tip spoilers. As can be seen in the picture, these open top and bottom (60 per cent on the top, 40 per cent on the bottom). When coupled with the rudder, the Starship turns very quickly for such a large ship. When rolling out of a turn, the model maintains speed and has very positive control response.

George has built several models with winglets, including hand-launch, 2-meter and standard-class models. Besides increasing the effective-aspect ratio, George thinks that the winglets greatly reduce tip-stalling and add to the model's overall stability. Since the winglets also reduce tip vortices, they contribute to the wing's overall lifting ability and increase its L/D.

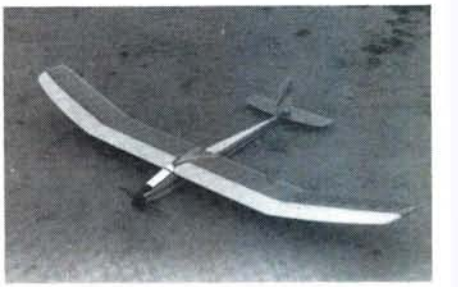


Astro Cobalt 020 is firewall mounted; S-33 servos and KO speed control fit snuggly in the nose of the electric BODST. Receiver and batteries are located under the wing. K&W 7x3 folding prop is a little large for the 020, but helps in preventing bent motor shafts.

If you have an interesting model, how about sharing it with the rest of us? Send me a few photos (preferably black and white) and a good description, and maybe I'll feature your model in a column.

Cyanoacrylate Glue and Shear Webs

Be careful about where and how you use CA glues. On about the fourth launch of George Ritter's Starship, the wing blew up at the end of a moderate zoom. This was really a surprise, as George is an excellent builder. We gathered the pieces and closely examined the breaks in an attempt to determine the cause of the failure. The spar was large enough, and the I-beam shear webs were full width, yet the wing failed.



Prototype Mini-Challenger is powered by an Astro Cobalt 035 flight system. This scaled-down version of Astro Flights' 2-meter Challenger should be released as kit sometime this summer.

On closer examination, we found that the shear webs were only glued along their edges. George had made sure that the webs were an absolutely perfect fit between the spars, and had then capped them with the top spar and wicked in regular CA on both sides, top and bottom. The glue only penetrated about 1/32 of an inch and then ran down the end grain of the shear webs. The spar failed because there was almost no glue between it and the shear webs.

Shear webs should always be glued in with the glue covering their entire surfaces. They should be glued to the lower spar, their upper surfaces coated with glue and, finally, they should be capped with the top spar. The best glues for this are alphatic resin or slow CA.

By the way, George has rebuilt the Starship and has it out flying again. The design shows a great deal of promise and certainly draws a lot of attention whenever it's flown.

The Mini-Challenger is an excellent flying model and should be very popular. Its small size makes it easy to transport and to keep in the car for possible lunch-time flying.

Hand Launch and Electrics

If you've flown sailplanes for any length of time, you've either flown, know someone who flies, or have read about hand-launch gliders. This phenomenon has really taken the soaring fraternity by

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MICRO LASER

(Continued from page 59)

center, glue each rib in place. *Don't glue in the root rib at this time.* (Note that the two central ribs are each two parts.)

Now glue the top spar into place in the top notches of the ribs. To attach the root rib properly, the wing assembly must now be blocked up at the wing tip in such a way as to make the top spar exactly level with the building board. The root rib can now be installed at a 90-degree angle to the building board. This procedure will ensure that the wing will attach to the fuselage at the correct angle. The leading edge is now tapered toward the top and shaped to the airfoil contour. Do the same for the rear spar. Apply the top sheeting to the wing leading edge, trailing edge and center section. Next, do the same for the bottom of the wing. All top and bottom capstrips are now installed.

To make the ailerons and the root section of the trailing edge, start by cutting the bottom sheet to size and then pin it down to the building board. Now add the aileron leading edge which should be tapered to exactly match the wing's rear spar. Now add all of the aileron ribs and the trailing edge ribs, sanding to shape. Cut the ailerons free from the root trailing edge. The trailing edge assemblies are now attached to their respective wings. Be sure to bevel the leading edges of the ailerons to allow free movement when they are hinged.

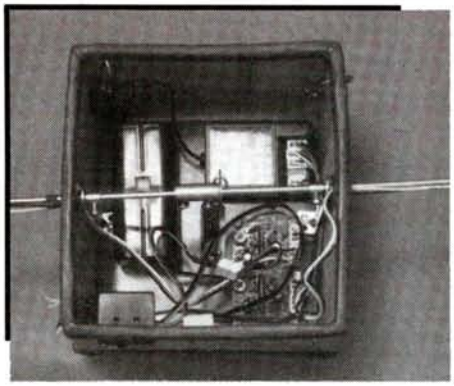
To attach the wings, place the wing joiner into the fuse, but don't glue it at this time. Slip both wings onto the joiner, butted tightly against the fuse sides. After making sure that the wings are held at the correct position, drip CA over the wing

(Continued on page 74)

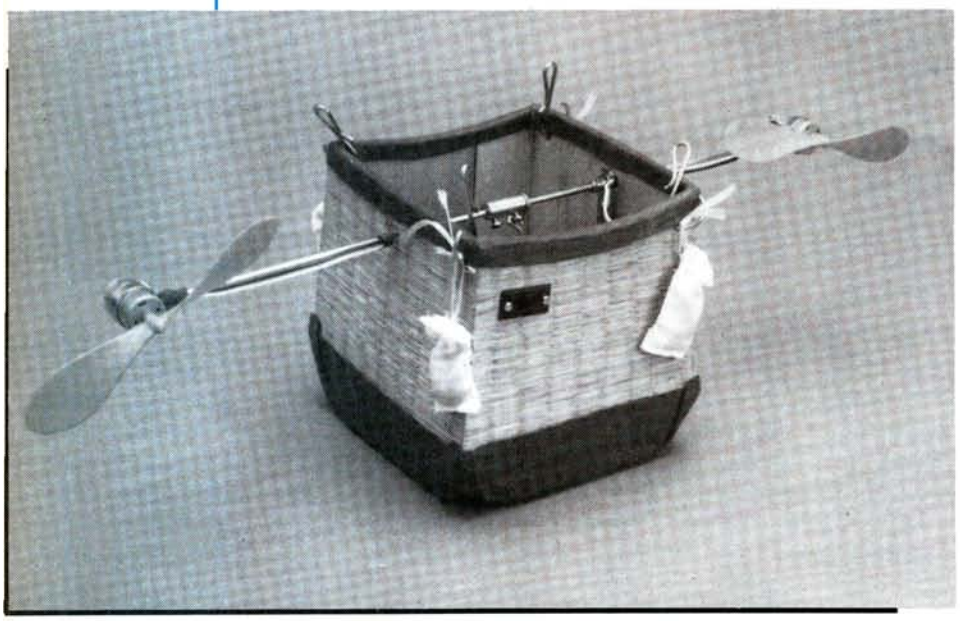
Launching for maiden flight; confident author and daughter.

System as it arrives with Aristo-Craft radio, canopy, balloons, basket and motor.

Top view of basket showing battery pack, RX, switch and two speed controllers.



Basket showing outriggers with electric motors for steering. Note sandbags!



All parts are included in the kit except the helium, which can usually be obtained from a local party supply store. I rented a tank of helium, as I couldn't get the inflated balloon into my car. Incidentally, if you rent a tank be sure to get a balloon-filler valve.

The Rozier system consists of these components: a balloon envelope of red, white and blue nylon; two 100gm latex weather balloons; one weather balloon clamp (binder clip); one gondola with radio-control components and motor assembly; two propellers (to be mounted on gondola motors); eight ballast bags (of slightly varying weights); one Challenger 4000 4-channel radio-control transmitter; one Ni-Cd battery charger; twelve rechargeable Ni-Cd batteries (AA size), owner registration card, and an AMA membership application form.

Let me give you some details on the radio system; it's the Aristo-Craft* Challenger 4000. The AM system consists of a HP-4T75D transmitter, HP-4RN75D receiver, two HS 402 servos and two speed controllers. The receiver is completely wired to the battery and two speed controllers, and is mounted in the gondola along with two small electric motors mounted on 4½-inch-long outriggers driving 5-inch propellers. The Challenger 4000 system operates on Channel 54, 72.870 MHz (green, yellow). Twelve Ni-Cds (4 for the receiver, 8 for the transmitter) and charger are also included. The Rozier system is complete except for helium and needs no building.

The balloon's radio system is used in the following fashion. The transmitter has two control sticks, one on the left and one on the right. Both left and right sticks move in two ways: side to side, and up and down. The side-to-side motion of the left stick controls the left propeller. Similarly, the side-to-side motion of the right stick controls the

(Continued on page 96)

PACER TECH

1987

SCALE MASTE

by RICH URAVITCH

RS

All the high rollers gathered in Vegas and they all made their points!

U.S. SCALE MASTERS

I GOT INVITED to Las Vegas last October; to the Gold Coast Hotel and Casino—*Not* by Wayne Newton or Frank Sinatra, but the Scale Masters judging committee. I really looked forward to it, as the last time I was "invited" to the city without clocks was some thirteen or so years ago when the invitation was for a short stay at Nellis AFB.

My purpose on this visit was to participate in the flight judging of the 1987 Scale Masters competition. Pacer Technology, as some of you may already know, is the company which manufactures the ZAP line of cyanoacrylate (CA) adhesives, and it has been sponsoring this event almost since its inception seven years ago. This year's competition was hosted by the Las Vegas R/C Club whose president, Craig Hath, was also the CD. If the name sounds familiar, you're probably a regular *MAN* reader, helicopter enthusiast or both, as Craig also writes our "Helicopter Challenge" column.

The nicest-looking pair of 38s ever! Both from Scale Flight kits. Bert Baker is in the background; Dee Garcia is nearest camera.

Dick Hansen's Jenny just about to touch down. Built from Proctor kit, weight is less than 10 pounds.

Stuka by Bob Francis on takeoff. Scratch-built from own molds. 105-inch span, 28 pounds.

The Las Vegas Tourist Bureau will probably tell you that it very rarely rains in Vegas, and they're right . . . usually. The weather for this weekend was rain with intermittent periods of drizzle.

Friday was practice day, strategy day and, for me, photo day. There was a total of 57 magnificent scale replicas on hand (each one a winner of one of the 17 regional Scale Masters competitions), plus international entries. The subjects ranged from Jeff Troy's fragile-looking Bleriot to Bill Harris' fire-breathing F-4D Phantom and everything else in between. Interesting, but not really surprising, was the fact that over half of the entries were large-scale WWII subjects—mostly warbirds. Their popularity is due, at least in part, to the smooth flying qualities provided by the large size and 20- to 25-pound

Unique, infrequently modeled subject, the Maule M-6 Super Skyrocket by Claude Tanner. ST 3000 hauls its 22½ pounds around in STOL fashion.

Two gorgeous Wacos. Charlie Nelson's VKS Cabin and Jack Buckley's YMF-5. Both O.S. 90s 4-stroke-powered.

Bob Hanft's Beech T-34 Charlie from the R/T Assoc. kit took a well-deserved 4th place. Colorful Navy scheme.

South African Glen Roberts entered this outstanding 1/3-scale Cub. Pilot's Choice Award for "Best Civilian Airplane."

A large part of the weekend was spent wearing foul-weather gear. "Unusual weather for Las Vegas," we were told!

Frank Tiano's attractive Kawasaki KI-61 Hien. Looked and flew great, with some of the prettiest wheel-landings of the meet. Finished in 24th place! Tough competition!

weight. They seemed oblivious to any wind conditions.

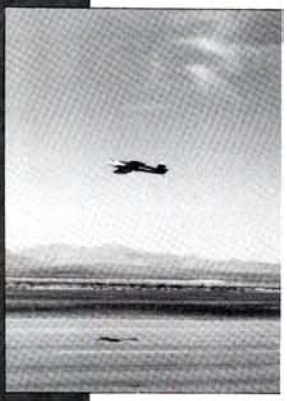
I've always been interested in Scale, and have a feel for what it takes to produce some of these masterpieces. That same interest also sparks a recognition of unique or unusual achievements. Any of you who've ever worked with aluminum or printers' litho plate for your scale subjects already know that it's great for access panels, gun-bay covers and similar small parts. You've also discovered that forming it around curves isn't easy. So how did Charlie Chambers manage to cover his *entire* P-51 Mustang with it? This airplane can only be considered outstanding by *any* measure. How about Dave Pape's ninth-place finisher?—a 1933 Kinner Sportster. Scratch-built to ¼-scale, Dave

Brian O'Meara finished in 28th spot with this outstanding Scale Flight P-47; only one of many in this competition.

Mel Santmeyer's Staggerwing Beech returned this year. It seemed indifferent to the ominous weather. Highly modified Byron Originals kit.

U.S. SCALE MASTERS

Scale Flight P-47 Thunderbolt on final. Built by Bob Olson, this razorback version uses Webra Bully, weighs 24 pounds.



Soft-spoken artisan, Charlie Chambers, adjusts gear linkage on his superb, metal-clad Mustang. Detail is evident in close-up on previous pages.

also made the 5-cylinder Kinner engine which powered this 27-pound beauty! Bruce Bender brought his "smallish" (70-inch) Mk.XIV Spitfire from Canada. It was powered by a geared O.S. 60 and had the nicest sound of any model at the meet.

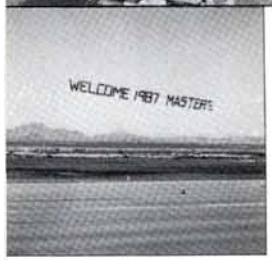
Glen Roberts, from South Africa, brought the largest airplane to the meet—a 12-foot Cub. That's *twice* the span of the mini, man-carrying homebuilts described by Budd Davisson elsewhere in this issue! Glen flew it in a very realistic manner; and the landings?—nearly perfect!

Before the weather really turned sour, we were all treated to some demo flying by Ron Gilman who rocketed around with Bob Violett Models' Viper and Aggressor. These ducted fan sport jets were really impressive, as Ron flew them through a series of pattern-type maneuvers which clearly depicted their broad flight envelope. Jerry Kitchen did some amazing things during his demo flights with the Hobby Shack EZ Chipmunk. The guys I talked to mentioned that he can fly *any* airplane as he flew this one!

Saturday's rounds were flown in the rain, and there was some talk about suspending flying because the weather sure wasn't getting any better. Flight-line judges were donning anything that would offer protection against the rain. I wore a trash bag, but quickly got rid of it when someone attempted to tie-off the top and stuff me into a dumpster! However, flying continued through the day in order to get the required rounds flown, since the possibility of Sunday being a washout was becoming more likely. In fact, Sunday started off as an extension of Saturday, but the sky cleared around midday, allowing additional flying and determination of the winners.

Once the scores had been tallied, Ray Torres repeated his 1986 Masters win; this time with a Beech Kingair in Navy markings. This twin-O.S.-40-powered model spans 91 inches and weighs just over 15 pounds. Typical of the caliber of model it takes to win this level of competition, the C90 features flaps, retracts, brakes, and nav/strobe anti-collision lights (which were very useful in Saturday's weather).

Canadian Dave Pape awaits his turn with his Kinner Sportster. Dave also built the 5-cylinder 4-stroke engine that powers this beauty!!



Above: ***Ultimate winner, Ray Torres, carefully observes Bob Fiorenze, about to launch his black F-4J Phantom. Bob finished 3rd.***
Left: ***Banner tow welcomed all attendees.***

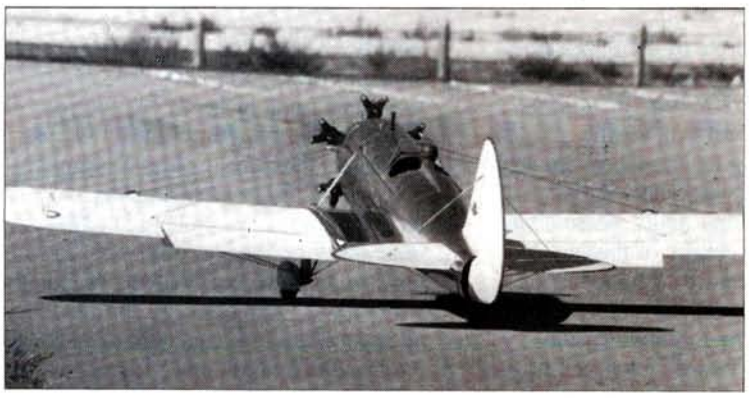
Ray's flying technique is what you would expect: disciplined and designed to show the airplane off in its best light. For example, he would taxi to the active, plant the nosewheel directly on the centerline, set the brakes and spool the engines up. This would create the most realistic "power-check shake" you've ever seen, with the Kingair bouncing and twitching, compressing the gear struts and not going anywhere. Coming back to idle power, Ray would release the brakes, advance throttle and accelerate down the centerline, flying the airplane off in a most realistic manner. Truly an extraordinary performance!

Right behind Ray was Dennis Crooks with his wing-foldin', torpedo-droppin', smooth-flyin' Grumman TBM-3E Avenger. Dennis' charming wife, Linda, calls for him and travels with him to many R/C events around the country. I heard that the Avenger was to be retired this year after being a strong competitor for a number of years. Since Dennis intends to win this thing eventually, it will be interesting to see what he'll field next. My guess is that it will also have folding wings, only maybe in a different axis?

Securing third place was Bob Fiorenze, flying his now well-known F-4J Phantom in black VX-4 Navy markings. Bob is kind of modest about his flying, offering only that he just makes "minor adjustments to the flight path; the airplane does the rest!" Sure, Bob! *My* "minor adjustments" usually require revisitation to the workshop for "minor" repairs!

Just behind Bob, in fourth and fifth places respectively, were Bob Hanft with his T-34C (built from the R/T kit) and Shailesh Patel, flying one of a bunch of Scale Flight P-47s on hand. If I didn't know better, I might assume a Navy bias, given that the first four finishers were all Navy-marked subjects!! Hmmmmm?

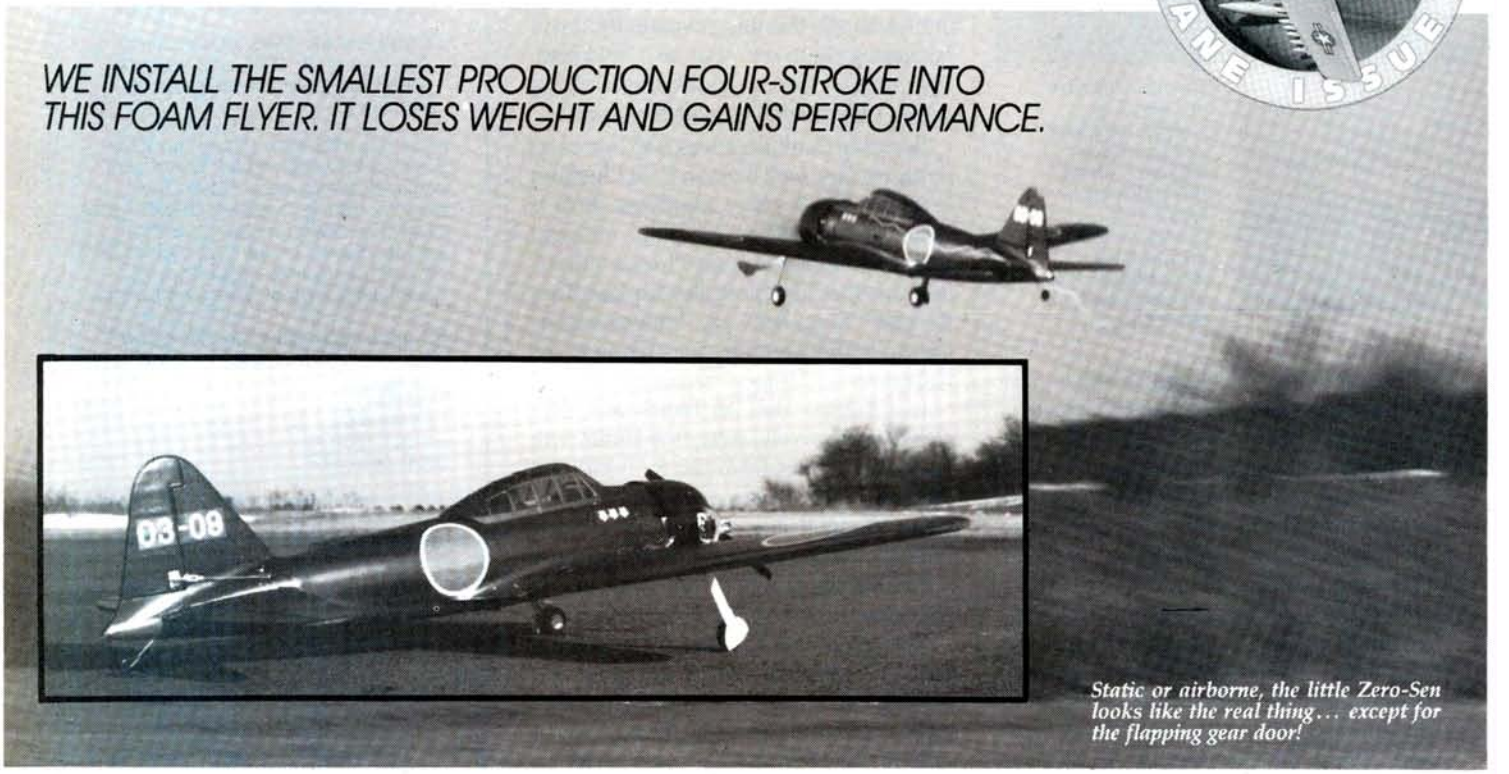
This event was the first Scale Masters that I've attended, and I consider it a privilege to have been asked to judge such a select group of scale models. In spite of the atypical Las Vegas weather, everyone seemed to enjoy themselves and, if they came to see *scale* airplanes, no one went away disappointed. Kudos is certainly in order for all the people involved in the planning, execution and sponsorship of such a prestigious event. I, for one, salute each and every one of you. ■



Chuck Fuller taxies his 104-inch span Ryan PT-22 into position. Zenoah 3.7 power used. Polished aluminum and white finish with red trim.

FOUR STROKE ZERO

WE INSTALL THE SMALLEST PRODUCTION FOUR-STROKE INTO THIS FOAM FLYER. IT LOSES WEIGHT AND GAINS PERFORMANCE.



Static or airborne, the little Zero-Sen looks like the real thing... except for the flapping gear door!

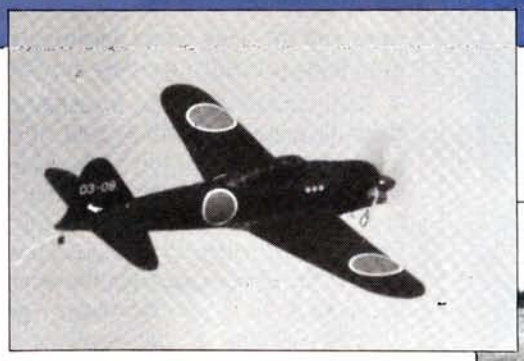
by CHRIS CHIANELLI

ONE ASPECT OF this hobby that keeps modelers interested for so many years is the fact that its possibilities are limited only by an individual's imagination and creativity. At one end of the spectrum is the drawing and scratch-building of an original design. Somewhere in the middle is kit bashing, i.e., the modification of a kit—usually a sport plane—into something sort-of scale. At the other end of the spectrum is something as simple as I've done here—marrying an airframe and powerplant that were never conceived as partners by their manufacturers.

I say that models (even small ones) go better with a 4-stroke—OK, maybe they just sound better. (Still a subjective statement, I admit). My proclivity for hanging a 4-cycle on anything is well known in my circle of flying buddies. Rich "King Ura of Jetdom" Uravitch bequeathed his Top Flite Bearcat to me—rivets and all. Ah, what a benevolent King he is—especially when he's gone a full weekend without crashing one of his "jetly" possessions or during a full eclipse of the sun—whichever comes first. I hope his majesty will be amused when he learns that I've ripped out that obnoxious, field-losing .60 2-stroke and will fit the Bearcat with an O.S. 1.20 Surpass, which is much more becoming and realistic.

I had great success mounting an O.S. .20 4-cycle in a Kyosho electric Zero. First, this modification was not due to the lack of sufficient power on the part of the supplied electric powerplant, but simply to my single-minded obsession with the 4-cycle engine. The Zero, as I stated in the October '86 issue of *MAN*, was quite good as far as electrics go. Add to this the fact that the conversion permitted the Zero to shed 6½ ounces. The overall flight performance, as well as speed and vertical characteristics, were all dramatically improved. To be concise, the little foam fighter has brisk performance and tracks in the groove, all topped off with excellent slow-flight habits, which aren't often found in a small, quick package like this one.

The O.S. FS-20 is the smallest production 4-cycle available today. This little engineering wonder started and idled so well right out of the box in 20-degree weather that the 2-pound, 4-ounce model, the Kyosho Zero, would sit on the blacktop without a hint of forward movement and would go to full



The performance of this little Warbird was vastly improved due to weight loss and power increase.

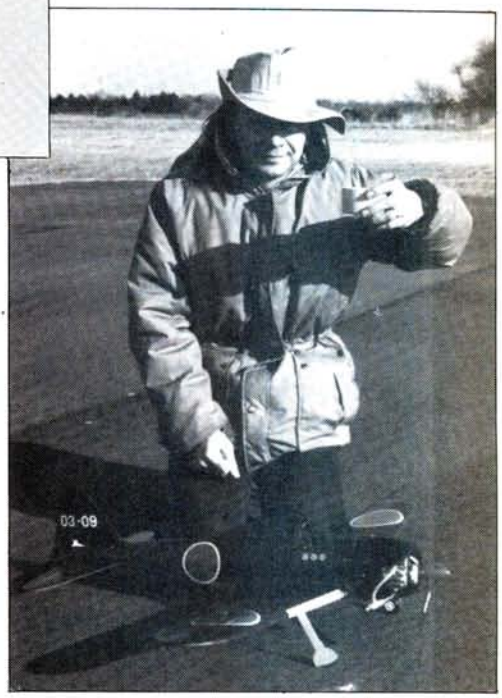
throttle with little or no hesitation.

With a little toe-in on the main gear, the tiny Pacific warrior will lift its tail for the most gratifying scale-like take-offs. But don't add too much toe-in, as I did, because I found myself with an unwanted pair of brakes on landing.

As you can see from the photos, the installation of the .20 was done with an O.S. predrilled mount. The firewall was backed up with some lite-ply to fill the hole in the firewall that accepts the electric unit and to add some beef for the blindnuts to grab on to. Although I didn't, you might want to beef-up the firewall/fuselage joint with a few fiberglass strips and some thinned epoxy. To date, mine hasn't failed, even though I omitted this option. With this arrangement, the supplied cowl is a bit too short, and the engine does stick out a bit.

Even though the foam on the Zero's tailfeathers is of a somewhat stronger, high-quality smooth-surfaced type, the tailfeathers will eventually crack in a hard landing. The fix is simple. Take two 1/64-inch carbon fiber strips, prep both sides of the stab and vertical fin with foam primer, and then glue the strips on both sides, sandwiching the foam between them. Make sure that the strips are positioned in line, top and bottom, otherwise the full strength potential won't be realized. This method produces an amazingly strong unit and adds only a minuscule amount of weight.

There was plenty of room in the fuse for my Futaba minisystem and a 4-ounce tank (I couldn't find a 3-ounce tank). With the .20 4-cycle, the battery was placed in the rear, just in front of the servos. If you wish to use a .15 2-cycle (Lord knows why!), the battery will need to go under the tank. With my setup, the Zero was only slightly nose-heavy, and I didn't sacrifice any great entry and exit snap-roll qualities!



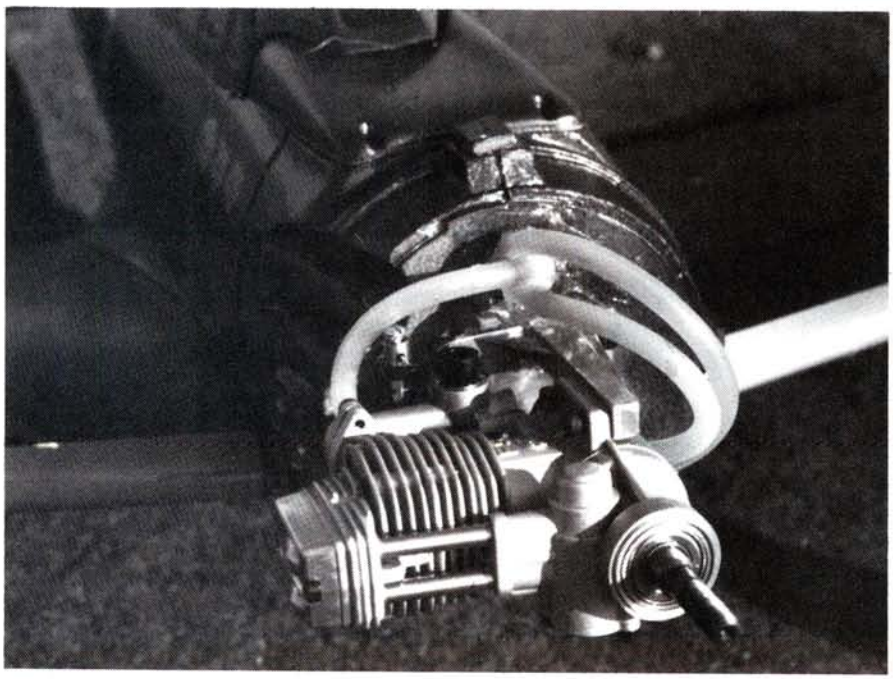
"We who are about to fly, salute you!" Intrepid aviator, Chianelli, celebrates his successful efforts.

I guess that part of the motivation behind this article is the desire to spur Great Planes* into importing this model as an option without the electric running gear. The kit (with a fuelproof finish) is already offered in Japan with a 2-cycle, and the little plane flies damn well. If you agree, let Great Planes know. I sure did.

For my color scheme, I copied the A6M5s of Genzan Kokutai, North Korea. These were used for training purposes in about 1944, and had bright red bottoms! It's highly visible, and this is so important on a small model. You can be sure that King "Ura" will take me to task about "a red-bottomed Zero." Some things can even put benevolence to the test!

**The following is the address of the company mentioned in this article:*

Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820. ■



The heart of the conversion is the 4-stroke O.S. 20; bolted via metal mount to a slightly beefed-up firewall. Stock muffler makes it almost as quiet as the original electric.

MICRO LASER

(Continued from page 62)

roots and the wing joiner, ensuring that everything is bonded securely in place.

• Radio installation. The installation of the radio equipment will depend on your particular system. The basic idea is just to fit everything into the plane any way you can. I positioned the receiver in the far front of the fuselage on the floor. I had to remove the plastic case from the receiver to make it fit. I put the battery pack directly on top of the receiver and cushioned everything with foam. The two servos were put just behind the wing joiner and held in place with servo tape. To save weight and space, I didn't use a switch or a charging jack. Just plug in the battery and the radio is on. The battery is removed from the plane for charging.

On one prototype I used 1/2A-size torque rods to operate the ailerons and a thin piano wire for the elevator pushrod. In another prototype I used thin cables inside of nylon tubes to actuate the ailerons and a small aluminum tube for the elevator pushrod. Follow your own preference. You should make your own control horns and clevises, since the commercially available ones tend to run a little large for such a small model.

• Building the cowl. I've used two different methods to form the cowling, and both worked out well. To make the cowl of fiber glass, start with a foam block and cut approximately to size. Tack-glue this block to the front of the plane. Now carefully carve the foam to the contour of the cowl and sand it as smooth as possible. Remove the foam "plug" from the plane. Using 6-ounce glass-cloth and epoxy resin, build up four layers over the plug. When the epoxy glass is fully cured, trim all the edges of the cowl until smooth. Now use a solvent to dissolve the foam from the inside of the cowl. You'll be left with a nice, thin, light fiber glass cowl.

An alternative method is to carve the cowl directly out of balsa. I prefer this method since it isn't as messy and I like working in wood. Using ½-inch thick blocks, form a box roughly in the shape of the cowling. Now simply carve away until you have the correct shape. Hollow out the inside of the cowl as much as possible to allow room for the engine.

• Landing gear. I was able to find

(Continued on page 79)

EZ

SUPRA FLY 25

Supra Fly 25 breaks ground in a hurry after minimum ground-roll.

A compact, colorful performance bird that flies like its big brothers.

by MIKE LEE

IT'S BEEN KNOWN for a long time that larger aircraft are favored over their smaller brothers because of the apparent smoothness and ease with which they fly. Most of us believe that the smaller planes are "twitchy" and "squirrely," and many pilots shy away from them. Every once in a while, along comes an exception to the norm that seems to invalidate the whole theory.

Mike (right) and his flying buddy, Orlando Contreras, staged some impromptu dog-fights after they both got comfortable with their Supra Flys.

This is the case with the subject of this review, the Hobby Shack* EZ Supra Fly 25. In the tradition of the famous EZ line of kits, the Supra Fly 25 is an ARF-type aircraft utilizing a basic balsa and ply frame and covered with a highly resilient plastic skin. There's no painting to do, no finishing to the subassemblies and no hassle making this aircraft. The result is a very attractive airplane that flies well.

There's also a wood kit version of the same 25-size Supra Fly, which is known simply as the Supra Fly 25 Kit. Although it won't get the builder into the air quite as quickly as the EZ version, this aircraft has the same proportions and features as the EZ but has a slightly smaller wing area. I'll concentrate on the EZ version this time.

Our Supra Fly 25 looks like a scaled-down version of its larger 60-size brother. I was pleased with the Supra Fly 60 as it's a fully fledged pattern contender with no vices, so I expected great things of this junior-size pattern/sport bird.

CONSTRUCTION: Since the EZ Supra Fly is an ARF, there's no real construction involved; only assembly of the major subassemblies. The wings are first; simply two mated halves. The wing utilizes a balsa-ply- and carbon-fiber-reinforced main spar. It's strong enough to keep things together, while being secured firmly between the wing spars. As in the larger version, this is a top-notch spar with carbon fiber reinforcement.

The kit includes a medium-set epoxy to use in the construction; enough to assemble this ship. Use a generous amount to join the wings. For the first time with any ARF kit that I've seen, the hinges for the control surfaces were already mated and glued. These are usually not assembled but are glued by the modeler. A more-than-excessive tug proved that they did hold their ground. A top and bottom plastic cover finishes off the wing.

On the fuselage, mounting the horizontal stab comes first. A little epoxy makes small work of this. The vertical stab comes next, followed by the tail fairing. This hides the raw stuff at the tail and nicely cowls-in the fuselage. A touch of Hot Stuff* seals the edges quite nicely. At all places where epoxy wasn't used, Hot Stuff instant adhesive was used to create the bond.

The rudder is the only surface part not previously mounted to the airframe. This is because the tail wheel must first be fitted and mounted. This will take all of five minutes, and the rudder and tail wheel can then be mounted to the fuselage.

Now move to the nose and start with the engine installation. The powerplant we used for our Supra Fly 25 is the latest offering from Magnum Engines*, the Magnum Pro 25 FSR ABC Air. This engine is a Schneurle-ported, ABC-designed engine featuring a ball-bearing-supported crankshaft, advanced timing and a precision-fitted piston-to-cylinder fit that needs no break-in. The carb on the Magnum Pro 25 Air is a two-needle, automatic metering unit which provides very good throttle response. The muffler is a standard expansion chamber-type unit made of cast aluminum. It was this last item that I had problems with in the set-up of the Supra Fly.

Mounting the Magnum Pro with the muffler presented a problem with clearance on the firewall. The rear end of the muffler hits the lower corner of the firewall and prevents mounting the muffler to the engine. There were two ways out. The first was to cut away a part of the firewall to allow clearance for the muffler. The second was to forget the muffler and opt for a tuned pipe. The deciding factor was that I really didn't want to cut the nose of this pretty little bird, so I chose a tuned pipe.

I used a pipe and header from HGK of Japan, available from RJL Industries*. However, virtually any other commercially available pipe and header will work as well. With this pipe installed, I had the look of the big pattern planes!

After finishing the nose section, install the throttle cable and fit the cowling, which is a well-made, flexible plastic unit. It won't crack or shatter from engine vibration and can be cut easily with a pair of good scissors. It's held in place with three wood screws, and you can easily get a close fit to the spinner.

RETAINS THE FORM—EVEN AFTER SHRINKAGE

Speaking of spinners, this is the finest spinner I've ever seen in an ARF kit. The spinner is a plastic cone fitted to a metal spinner plate. The cone keys into the plate and is then secured with two machine screws. It makes a very true and very safe spinner.

The airframe is finished with radio installation and fuel tank and canopy/cockpit appointments. A Williams Brothers* sport pilot was seated in the front seat of the bird. I chose the Futaba* Conquest FP-6NLK 6-channel radio. It was mated to standard S-138 servos and a 500mAh battery. It all fits into this compact bird, but I admit to trimming the servo tray about ⅛ inch to get it to fit. The Futaba Conquest is a perfect sport radio. Retractable landing gear is the only option provided for the Supra Fly 25. The Supra Fly kit provides instructions on fitting the gear and even provides preformed wheel wells to use when retracts are installed (a nice touch). You can even fit a Supra Fly 25 with the retracts later on, as the design is simply the mains being mounted to a hardwood block. This block is then mounted to the gear blocks in the wing with wood screws. I opted to remain in the fixed-gear position.

The junior-size Supra Fly weighs a measly 3.25 pounds. Spread that over a wing area of 434 square inches, and you have a light wing loading of only 17.7 ounces per square foot. Great fun! I had to add 4 ounces of lead to the nose to correct the balance, but that was a small price to pay. Add the trim to the wings and you're ready to fly!

PERFORMANCE: As I mentioned before, we expected great things of the 25-size Supra. Although I knew that this is a smaller bird and probably prone to being twitchy, I still expected performance. It didn't disappoint me!

The Supra Fly 25 took off easily and proceeded to climb out. The first thing I noticed was the feeling of solidity. The Supra Fly doesn't twitch or feel like many small birds do, but handles like a much larger machine.

Rolls are precise, and pitch response is immediate. The latter almost provides too much response, despite a very conservative amount of actual movement at the elevator. So solid was the flight of this bird that we had it doing inverted flight at less than three feet off the deck on the first flight! In fact, during the first three flights, we performed the entire FAI turnaround sequence. That's big-ship performance!

Our Magnum Pro 25 Air performed flawlessly, providing a conservative 12,000rpm on a Yoshioka* 9x5.5 prop. This, coupled with the tuned pipe, spelled some pretty impressive vertical performance. Other pilots who both watched and flew the Supra Fly commented that it disappears into the distance in a hurry. All were impressed with its performance.

The acid test came when I encountered a couple of other

(Continued on page 85)

MICRO LASER

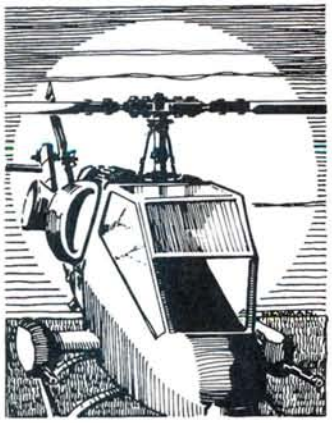
(Continued from page 74)

landing gear from a small model Cessna which was perfect for the Laser. If you can't come up with ready-made gear, you'll have to make your own. You can buy dural gear blanks from the hobby shop, and these can be cut and formed to the desired shape. It's also possible to use piano wire to form the gear and attach it firmly to former A. Build up the wheel covers in three layers as shown. A No. 2 screw is used both as an axle and to hold the covers to the gear. The gear assembly is then attached to the bottom of the fuselage with two small nylon bolts which will break away in the event of a hard landing, so saving the plane from serious damage.

- Mounting the engine. Since the sizes of engines and engine mounts vary, you'll need to make a custom installation. Basically, all that's important here is to put some spacers in front of former A so that the engine will be positioned correctly within the cowl.
- Covering. Although it isn't necessarily the lightest covering material, I used MonoKote for my models. I like the way the material goes on, and I get consistently good results. I also used MonoKote for all the markings.

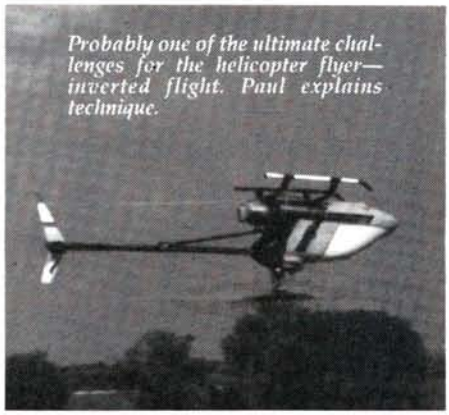
PERFORMANCE: This model is very small, so it has a small wing area, and its wing loading is on the high side. On top of all of this, the engine power is not exactly tremendous. This all adds up to a plane which can be a bit tricky to handle and requires constant attention to fly. If you build your plane light enough and have the engine operating at full power, the Laser will fly quite nicely. The plane should definitely be hand-launched, since it has no form of directional control on the ground. Once in the air, the Laser will perform a nice aerobatic routine. It's a spectacular sight to see this tiny ship do its thing, since it's capable of some amazing maneuvers for a plane this small. Be sure to keep it close in so that you can see it!

The next time that there are a bunch of large Laser models flying at your field, just watch the reaction when you fire up this "itty-bitty" Laser and really put on a show! ■



Helicopter Challe

by PAUL TRADELIUS



Probably one of the ultimate challenges for the helicopter flyer—inverted flight. Paul explains technique.

WHEN I GOT INTERESTED in flying helicopters several years ago, I couldn't believe that all those nuts, bolts and bearings would really fly. Not only do helicopters fly very well right-side-up, but they also fly very well when inverted. This is particularly amazing because, when inverted, the mass is above the rotor disk, and the whole helicopter balances on top of the main shaft. You'd think this would be a very unstable position, and that the helicopter would be ready to fall in any direction, but the helicopter is actually quite stable when inverted, owing to the high gyroscopic force of the main rotor blades. Once mastered, inverted flight is always a real crowd-pleaser at the local field or when putting on a flying demonstration.

Flying an inverted helicopter is less disorienting than flying a conventional airplane inverted, because the transmitter has a switch to reverse several of the control functions. Those of you who fly fixed wing know that when flying inverted, the elevator and rudder are both reversed in their controls, but not so with a helicopter. When the inverted-flight switch is activated, it reverses the direction of the elevator, rudder and collective controls, so that the helicopter will fly inverted with the same control movements as if it was upright. That certainly makes everything a lot easier.

To fly your helicopter inverted, you must have a correct combination of both helicopter and radio equipment. First, the helicopter must be able to perform aerobatics, or at least rolls, to get into the inverted position. This may seem like an obvious point, but some of the trainer-type helicopters don't have any aerobatic capabilities, so inverted flight shouldn't even be attempted.

A helicopter must also have the required collective range to fly both upright and inverted. Maximum collective pitch should be at least 10 degrees for autorotations, with a minimum pitch of at least -6 degrees for inverted climbouts. This equates to a total minimum pitch range of 16 degrees. If your helicopter doesn't have this minimum collective range, you may still be able to fly inverted, but it would mean sacrificing pitch from the positive pitch range.

Rotor blade airfoil shape is also an important factor in inverted flight performance. A fully symmetrical airfoil offers the best combination of both normal and inverted flying, but a semi-symmetrical airfoil will also work well. The rotor blades with flat bottom airfoils may be able to fly inverted, but they won't be as efficient as the other designs and will certainly require greater negative pitch angles.

The fuel tank should be located as close as possible to the engine to preclude any fuel-feed problems. Most helicopters have the fuel tank mounted slightly below the main needle valve for optimum fuel draw during normal flight, but that places the fuel tank slightly above the engine when the helicopter is inverted. This high fuel tank position while inverted will cause the engine to run slightly richer, but this isn't usually much of a problem. Adding a fuel pump, either to the engine or mounted externally between the fuel tank and engine, will normally solve any potential fuel-draw problems. Also, turn the helicopter upside-down and make sure that the fuel pickup tube is capable of getting to the fuel in any position.

The last point to consider about the helicopter is its in-flight visibility. With most helicopters being of the pod-and-boom-type, they are rather hard to see at a distance. When you're flying inverted is no time to be wondering about the position of the helicopter! I therefore use a bright color scheme that will stand out against a background of sky, clouds, trees, etc.

While on the subject of visibility, don't overlook the color of the rotor blades, because the rotor disk they produce should also be visible in flight. Generally, a light-color rotor blade will be highly visible while flying but, if you already have a dark set of blades, you can add white striping tape to make them more visible. I once had a set of black blades that I couldn't see at all while flying, so I added two sets of three-inch white blade covering to each blade. The first piece was placed near the blade tip and the other, three inches closer to the root. This produced two white circles against the sky as the helicopter was flying, which not only made it easier to see, but also aided my overall orientation to the helicopter.

As for your radio equipment, you must have a helicopter radio with an inverted-flight switch to change the direction of the elevator, rudder and collective channels. If you don't have this type of radio, then any sustained inverted flying will be extremely difficult, if not impossible. Radios that are designed for inverted flying should also have separate collective pots for both maximum and minimum pitch settings when in the inverted mode. Without these separated inverted trims, the collective linkage must be adjusted to provide the needed throw for both normal and inverted flying.

nge

HELICOPTER SETUP: The primary change in your helicopter, from normal to inverted flying, is made to the collective pitch range. As I already mentioned, you need a collective pitch range of at least 16 degrees for a combination of normal and inverted flying, with the inverted flight pitch range being about +2 degrees (for descents) and -6 degrees (for inverted climbouts). This large collective range usually requires a longer arm on the collective servo for greater throw, and this may also make the collective pitch control more sensitive during all phases of flight. Check you radio owner's manual for specific guidance on obtaining these pitch requirements, and adjust the servo throw and linkages as necessary.

Because the helicopter is remarkably stable during inverted flight, the aileron sensitivity remains as required for normal aerobatic flight. Dual rates may also be helpful for inverted flying if the control response for aerobatics is too sensitive for

Paul practices inverted technique. The operative word being "practice." Real confidence-builder once you're comfortable.

normal flight and hovering but, be careful, because this is just one more switch you'll have to contend with while practicing a new maneuver.

I recommend entering inverted flight from half a roll, so no change of elevator sensitivity is required. However, most helicopters require a slight change in trim when inverted. Both my Champion and my X-CELL needed about three clicks of nose-down trim to maintain level inverted flight.

Idle-up will also be needed during inverted flight to maintain rotor speed, no matter what collective pitch may be needed. To make sure you have sufficient rotor speed, even while descending inverted, adjust the idle-up to maintain good hovering rotor speed with the throttle stick near its full minimum position. However, I don't set the idle-up any higher than needed to make descents easier, and a higher rotor speed will increase the sensitivity of the collective.

FLYING INVERTED: With your helicopter and radio set up for inverted flight, pick a fine day to start your practice. You should be able to see your helicopter clearly with the sun at your back and a steady wind of about 10mph. These conditions are perfect. The reason you'd like to have a little wind is to reduce your groundspeed, which will give you longer to practice level inverted flight before a turn is required.

Initial attempts at inverted flying should be started from a height that will allow a mistake or two. Fly high enough to recover, using a Split S (which is no more than pulling the nose down and through to level flight as in the last half of a loop) and still have plenty of altitude to spare. This usually means that an altitude of about 150 feet is a good compromise between loss of helicopter orientation and a safe recovery altitude. Admittedly, this is high, but it's better to have excess altitude in case you become disoriented.

I don't recommend practicing inverted flying without flipping the invert switch. Some people like to roll inverted without flipping the invert switch and to try to get a feel for inverted flying in this way. This isn't a very good practice, because the

(Continued on page 91)

About Those Engin

by JOE WAGNER

FROM MY INCOMING MAIL, I've learned that besides getting helpful advice and technical information in this column, many of my readers like interesting background material, especially about old-time model engines. Here are a couple of unusual items:

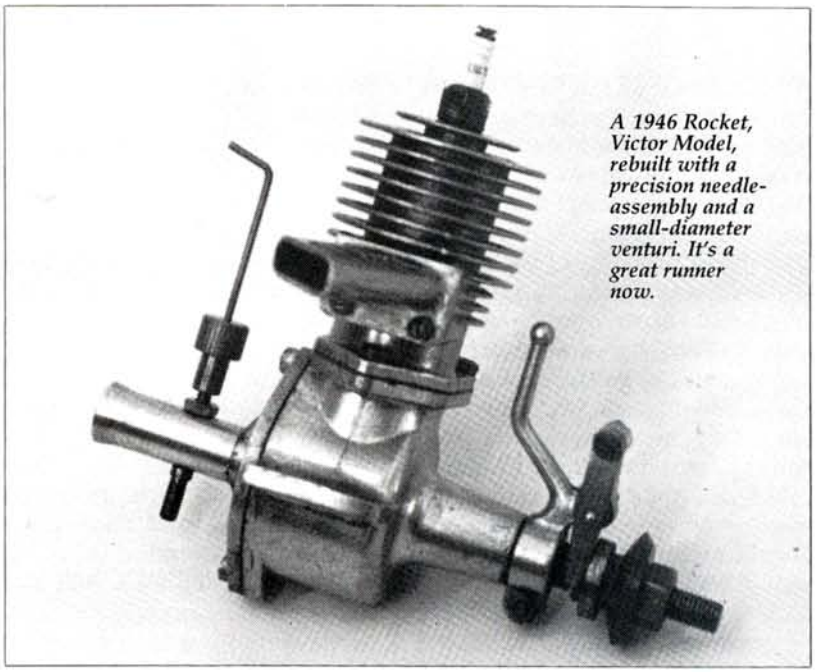
The Rocket .45 was one of the first model motors to be openly manufactured after the World War II ban on such products was lifted. (Model engines were made surreptitiously all through the war years, but that's another story.) It was an improved version of the prewar May Motor and Silver King. The 1945 engine was named Rocket, Victor Model.

A well-made engine for its day, the Rocket had just enough freaky features to keep it from becoming truly well-liked. The main problems were its large-diameter venturi and crude needle valve. Also, its fragile timer assembly couldn't take much punishment. Aside from these flaws, the Rocket .45 provided plenty of power. When running right, it equalled the output of a Brown .60.

The Rocket had a unique piston design. It was made in three pieces; four, if you count the nut that held it all together. The piston itself was a simple inverted-cup shape with a hole in the center. A bent piece of sheet steel provided the baffle, and the wristpin attachment was a clevis-like arrangement that fit inside the piston, with its threaded end passing through the hole and a matching one in the baffle. A steel nut completed the assembly.

It sounds complicated but it was really an effective and economical way of producing a lightweight steel piston. I've never heard of one coming apart while running; and it helped to make the Rocket a smooth-running motor despite its weight (light, for a .45) of only 10 ounces. (A typical modern .45 weighs one pound.)

When it first hit the market in 1945, the Rocket cost $22.50 and, over the next couple of years, almost 30,000 were sold at that price. In late 1946, Corporate Products (the Detroit makers of the Rocket) came up with an improved version of their motor, which was the Model 4610. It had a better ignition timer (the original tended to "float" at higher rpm), a decent venturi (the old one was far too large in diameter) and a better needle valve. (One of my Rockets would run nicely with the needle unscrewed completely out of the engine!)



A 1946 Rocket, Victor Model, rebuilt with a precision needle-assembly and a small-diameter venturi. It's a great runner now.

Then General Motors Corporation, looking for a name for their new Oldsmobile engine, decided on "Rocket." But the name had already been registered for the model airplane motor. However, to GMC this was no problem; they simply bought the rights to the name from Corporate Products.

So far so good. Corporate Products received an unexpected windfall from this sale. This was good because, by that time, sales were noticeably slowing down. But modelers were still buying the Rocket, mainly because the AMA had six engine classes. Also, in the .400 to .499 class there were very few motors available: the McCoy .49, Madewell .49, various Bunch engines of .45 displacement—and the Rocket.

So the company continued merrily cranking out model engines until GMC's lawyers called up one day and said: "What are you people doing? We own the 'Rocket' name now, and we don't want it on any tinny little toy airplane motors. So stop already!"

Corporate Products had no choice: They closed up, and the remaining inventory was sold—as cheaply as possible, to move it fast—through mail-order by the Little Mike Marx Toy Company. The sale price was $5.50 (postpaid) at Christmastime 1949. In mid-1950 the last few were advertised at $3.95 each (plus 50 cents postage)—surely the lowest price any model engine of that size ever sold for at retail.

Two columns back, I talked at length about the problems of counterbalancing single-cylinder model engines. My old friend Dan Lutz, service manager of K&B back in the 1950s, wrote, reminding me of the nylon-and-lead balance rotor that John Brodbeck Sr. came up with to

tame the engine vibration of the Greenhead .45RC.

Those were the days of reed-type multi-channel R/C, and the reed banks were quite vibration-sensitive. The K&B .45RC was the perfect-size engine for R/C airplanes such as Ed Kazmirski's Orion (winner of the 1960 World R/C Aerobatic Championship). But as originally designed, the Greenhead .45RC was far too much of a shaker. John Brodbeck found the solution by adding a rotor at the rear of the crankshaft. This was driven by the crankpin and had a massive lead-alloy counterbalance opposite.

This is a good example of practical engineering at work. John solved the Greenhead .45RC's vibration problems with intuition and ingenuity rather than by formal textbook engineering. He's worked successfully that way for many years, and his pragmatic problem-solving ability once almost made him a multi-

These shattered fragments were once a 1938 Baby Cyclone case. The metal is so brittle today, it can be crushed between two fingers!

millionaire!

Here's the story:

By the early 1960s, air pollution in the Los Angeles area had become a serious problem. The California authorities decided that a major cause of smog was the crankcase vapors emitted by the millions of motor vehicles in the state. Somebody suggested that these vapors could be pulled back into the car engines and burned, thus eliminating them as air pollutants.

It sounded good. A law was passed in 1965 requiring "positive crankcase ventilation" (PCV) for all motor vehicles in California, to take effect in three years. The automotive industry howled in protest. "It can't be done!" they insisted. "Look at all the older cars on the highway. They were never designed for a gimmick like this! You're asking for an impossibility. And even if it could be done, it would be far too expensive for the average car owner!"

But the law was on the books, and John Brodbeck saw it as a golden opportunity. He was sure he knew how PCV could be accomplished and adapted to fit practically all existing automobiles.

It took a lot of time, money and testing to prove John's concept to the California State pollution-control people. But his device, which the automotive bigwigs had called impossible, was fully approved in 1967. A market numbering literally millions of vehicles in the Los Angeles area alone was wide open. And K&B had the only approved PCV device in existence!

But City Hall cannot be successfully fought. Even though K&B had a working PCV actually on the market by then, automotive lobbyists were able to convince the lawmakers in Sacramento to repeal the PCV regulations for used cars. All John's efforts turned out to have been in vain. Roughly half a million dollars had to be written off; a major setback to K&B's financial status. That the company survived this and other setbacks is a tribute to John Brodbeck's continued ingenuity and refusal to give up, even when faced by a seemingly impossible situation.

Dan Lutz also sent me a plastic baggie containing a lot of little broken bits of metal. At one time, these bits were the crankcase for a 1938 Baby Cyclone. Was this destruction the result of vandalism or a high-speed crash of an old-time free flight onto a concrete runway? Not at all; Dan had merely tried to brighten the Baby Cyke's case in an ultrasonic cleaner!

This is the rear counterbalance rotor from a 1959 K&B Greenhead .45RC engine. The black portion is nylon plastic.

When you consider that watches and delicate jewelry are routinely cleaned ultrasonically, you can appreciate how horribly brittle the old Baby Cyclone's case must have been. I've mentioned the tendency of zinc alloys to embrittle, in an earlier column, and this actual example shows what I was talking about.

Here are some of the motors of yesteryear with castings that are likely to have deteriorated with time and exposure to model-engine fuel: all versions of the Baby Cyclone; all Syncro engines except the B-30; all of the early small motors made by Bill Atwood, such as the Hi-Speed, Bullet and Phantom; the Sky Chief; the Marvin; and the prewar Husky engines.

My mention of Ed Kazmirski "Kaz" a few paragraphs back reminds me that he discovered an odd quirk of R/C engines. He found that they would idle better when the crossbar on the glow plug was at right angles to the crankshaft center line! I have no idea how he came up with this discovery, but I do know how he used it.

Kaz marked the hex portion of his R/C glow plugs to show their crossbar orientation. Then he filed down the thickness of his plug washers as necessary to let each plug seat firmly in the engine head with its crossbar at 90 degrees to the head fins. This sounds like a lot of trouble to go to for a rather insignificant problem, but Kaz was a world champion R/C pilot. Maybe it did make a meaningful difference. One of these days I'll try it myself to see if it helps on my own R/C engines. (Hanno Prettner, beware!) ■

G-MAN

(Continued from page 35)

razor knife, or by using one of the balsa strippers on the market. The choice of wood depends on how it is to be used. The wing spars and tip plates should be cut from firm stock, while the leading edge can be made of slightly softer wood. The trailing-edge sheet is medium-weight quarter-grained stock.

The wing is built in two halves. Cover the plan with wax paper and start building by pinning the bottom main spar in place on the plan. Slip some ribs onto the spar and use them to position the trailing-edge sheet so that it will match any slight difference there might be between the length of your ribs and the plan. Pin the trailing edge in place and, starting with the *second* trimmed center rib, glue the ribs and webs into position. Slant the tip rib to the angle shown on the plan. The root center rib will be added later when the dihedral is established.

When all ribs and webs are installed, add the top main spar. Make sure that it's glued to the webs as well as to the ribs. The leading edge and front top spar can be installed at this time, but don't add the top trailing-edge sheet just yet, as it will be installed after the wings are joined at the dihedral joints. Build the other wing half in the same sequence.

When completed, sand the leading edge, the spars and trailing edges to the dihedral angle. Slice the dihedral braces from 1/16-inch plywood. Using a sharp razor, slice 1/16 inch from the root center ribs on each side of the main spars to fit the plywood dihedral braces. Place one wing-half flat on the bench, elevate the other to the dihedral angle and install the braces. Check for fit and then glue all joints.

When everything is dry, trim the two remaining center-section ribs at the main spar. Glue the two leading-edge rib sections together and position them between the leading edge and the main spar. Trim the aft rib sections to fit between the trailing edge and the main spar, separating them as shown on the plans and adding scrap 1/16-inch balsa to form the back of the servo well. Next, glue all of these rib sections in place, and add the top trailing edges and center sheeting. Notice that this center sheet goes *between* the spars rather than over them.

Make the ailerons from 3/16-inch stock; cut two inches from each and glue to the trailing edges at the tips. Sand the nearly completed wing and, when everything is nice and smooth, epoxy the aileron torque-rod guides to the center trailing edge as shown. Drill 3/32-inch holes in the ailerons to match the barbs on the torque rods, and trial-fit to the trailing edge. The ailerons will be installed after they, and the wings, are covered.

The stab, elevator and rudder are built right over the plan just as is the wing. The two 1/32-inch plywood spar doublers shouldn't be eliminated because they add much strength to the stab in this area. When complete, join the mating surfaces and sand the outlines to match. Inset and epoxy the music wire carry-through in place at the leading edge of the elevator.

The fuselage sides are cut from medium-to-soft 1/16-inch balsa sheet. Don't cut the wing saddle into the sides until after the doublers have been glued in place. The doublers are also 1/16-inch balsa; this time a little harder stock and laid with the grain at a 45-degree angle to the grain of the sides. Once the doublers are cemented in place, epoxy the small 1/64-plywood plates in the firewall area as shown. Pin the two sides together, and sand them to the same outline with a sanding block and 100-grit sandpaper. While they're still pinned together, cut the wing saddle and drill the 3/16-inch holes for the wing-holding dowels.

Separate the sides and add the 3/32-inch square uprights as well as the mounting rails for the tank and servo. Cut out the formers and the firewall, and then start assembling the fuselage by first gluing the two cabin formers in place on one of the sides. Make sure that they are perpendicular to the side by checking with a right triangle. When dry, glue the other fuselage side to the formers, making sure that it's in perfect alignment with the first one. Bring both fuselage sides together at the tail and glue; when dry, mount the firewall. It's a good idea to use epoxy to hold the firewall in place.

Build up and glue the landing-gear mount in place, just in front of the first cabin former. Sheet the bottom of the fuselage with 1/16-inch balsa, with the grain running across the fuselage. At the tail, the balsa is replaced with 1/16-inch plywood for the tailskid mount. Epoxy the 3/32-inch copper tube fuel and overflow lines, as well as the throttle line, through the firewall, and install the floor in the tank compartment. Wedge the tank in place with foam and connect it to the copper tubes with fuel tubing. Watch for, and eliminate, any kinks in these lines. Install the nyrod guides, then finish the cross-grain sheeting and sand the completed fuselage.

I suggest that you use Micafilm for covering, and follow the manufacturer's application instructions. Epoxy the ailerons to the torque rods, and hinge all

surfaces using any method with which you're familiar. Cover the tip plates separately, then glue them into place on the wing tips.

Trim the covering away from the stab where it contacts the fuselage on the bottom and the rudder on the top. Epoxy the rudder and stab in place and check the alignment. Trim the covering away, and epoxy the 3/16-inch wing-mounting dowels in place. Epoxy the tailskid to the 1/16-inch plywood mount.

The engine mount is attached to the firewall with wood screws. The G-Mark .061 must be mounted all the way forward on the Tatone .049 mount, and a disk of 1/4-inch plywood must be epoxied to the firewall behind the mount so that the muffler will clear the firewall. Harden the screw holes with thin CA, and paint the firewall with a coat of epoxy. When the engine has been mounted, attach the fuel line to the carb, and the overflow line to the muffler pressure tap, if so desired. Run a piece of soft, iron wire through the throttle nyrod and connect it to the throttle arm. Bend the landing-gear legs, add the wheels and then mount them in the gear mount with metal brackets and small wood screws.

Before installing the radio, assemble the airplane and check the balance point. Move the battery pack and servos around until the G-Man balances at the point indicated on the plans, and then install the radio in a position which maintains this balance. Connect the elevator and rudder to the servos with nyrods and clevises; use standard hardware to connect the ailerons. Make a Z-bend in the throttle wire to engage that servo. Check to see that everything reacts properly to the transmitter controls and, after a range check, the airplane is ready to fly.

PERFORMANCE: Even though hand-launches are a cinch, the first test flight should be from the ground and into the wind. Tracking is good, and the plane should require little rudder during the take-off run. Once the tail comes up, the airplane will fly. Unless there are some bad warps in the wing, any trimming necessary should be well within the range of the trim levers on the transmitter. Trim for level flight and do some "power-on" and "power-off" stalls to get the feel of the airplane. You'll find that there's little or no tendency for a wing to drop during stalls.

Snaps and spins are entered from a stall or near stall and recovery is almost instantaneous. Stall turns are accomplished in not much more than the length of the airplane. Inverted flight requires some trim change because of the airfoil, but it's smooth and predictable.

Landings are great fun. With the throttle on the G-Mark, you can set up an approach with just the right amount of power and smooth the plane right onto the runway. Remember, the G-Mark .061 does need breaking in and the more time on the engine, the faster it runs and the better the idle. G-Man and the G-Mark are a fun bundle!

**The following is the address of the company mentioned in this article:*

Cox Hobbies, 1525 E. Warner Ave., Santa Ana, CA 92705. ■

SUPRA FLY

(Continued from page 77)

pilots who had also assembled Supra Fly 25s. They were out for some fun and blood, and I was just the guy to give it to 'em! Let me tell ya, the Supra Fly can take some real punishment. There isn't anything that it won't handle. We engaged in heavy air combat for over half-a-dozen flights with no structural failures. That's tough performance.

The Supra Fly 25 lives up to the manufacturer's claims to provide pattern-bird performance in a small, compact package. You no longer have to settle for skittish small birds that try your patience and frazzle your nerves. This pleasing ARF, the EZ Supra Fly 25, will change your mind about small birds... in a hurry!

**The following are the addresses of the companies mentioned in this article:*

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.

Hot Stuff; distributed by Satellite City, P.O. Box 836, Simi, CA 93062.

Magnum Engines; distributed by Hobby Shack.

RJL Industries, P.O. Box 5654, Pasadena, CA 91107.

Williams Bros., 181 Pawnee St., San Marcos, CA 92069.

Futaba Corp. of America, 555 W. Victoria St., Compton, CA 90220.

Yoshioka; distributed by Hobby Shack. ■

GIANT STEPS

(Continued from page 53)

and marketing for a "dead horse." The fact that the Quadra engine has been bought out by a new company (and the supply lines are now opening up again, thank goodness!) indicate that there's a lot of supplier confidence in the future of the big planes.

It's not all beer and skittles, of course; there's a down side to building bigger models: They don't transport as easily as the .40-powered smaller model we usual-

GIANT STEPS

ly start out with. Given that we're now driving smaller cars, this can be a real disadvantage. Building a 9-foot wing in an 8-foot shop can lead to serious frustration, along with the problems inherent in painting a large fuselage in a small spray booth.

Some of these problems can be readily solved, and some can not. The small shop needs to be enlarged if you want to build larger models, and getting the space to do so can present a real problem. However, if you're serious about building large, you'll need to find the necessary space.

The transport problem isn't as serious. I've seen some remarkably ingenious small trailers used for transporting large models, and these trailers are often a better solution than having to buy a larger vehicle. A well-planned utility trailer provides more room, better space usage and greater safety.

One trailer was built on a frame available from Sears and provided room for several models, all the stores and repair items needed, as well as fuel, tools and other goodies. It wouldn't take much ingenuity to produce a design suited to anyone's specific requirements. These small trailers don't need to be as high as the vehicle towing them. Well designed and built (something not beyond most model builders), they can solve the transport problem quite well and at a reasonable cost—certainly far less than the cost of buying one of the cheaper vans (if there is a "cheap" van; I know I haven't seen one that qualifies!).

There are still modelers who haven't yet built a large model, but their numbers are diminishing. The attractions of larger models are numerous, so if you haven't built one yet, jump in. Once you fly a biggie, you'll be unlikely to either regret it or to abandon large models.

That's it for this month; except to ask for some input. To those of you who've built model trailers: How about sharing your experience and some of the details with us? I'll pick some out and pass them along to others who are interested in building their own. If you have photos (preferably black and white) or just some ideas you've incorporated into your model trailer, pass them along and I'll share them with the rest of our group. ■

QUIET FLIGHT

(Continued from page 61)

storm. Not only are these sailplanes a lot of fun, but competitions for them are springing up all over. Many sailplane pilots are also finding out that flying the little hand-launchers helps to improve their performance when flying larger models. The hand-launchers are definitely here to stay.

Lately, hand-launch models have entered a new area of flying—electrics! Bob Sliff, of Midway Model Co., put a 7-turn/7-cell Astro Cobalt 05 in a Gnome a couple of years ago. Bob and I have both flown this model successfully in a contest against 2-meter models. Larry Jolly put an Astro Cobalt 035 in his Flinger and flew it at the Astro Electric Champs two years ago. Last year, I flew one of my BODST hand-launchers with a 6-turn/7-cell Astro Cobalt 05 in the Harbor Soaring Society's F3E, 7-cell event. After the contest, I installed an Astro Cobalt 035 on five 800mAh cells with a KO speed controller. Climb rate was as good as, or better than, most 7-cell, 2-meter models with ferrite motors. I could get two or three good climb-outs to about winch-launch height, and thermal performance was excellent at a flying weight of 26 ounces. I then replaced the flight system with an Astro Cobalt 020 of four 800mAh cells, and this reduced the weight by a couple of ounces. With this setup, I get one, maybe two climb-outs to thermaling altitude. I try to increase the climb rate by finding a thermal while under power, and I often find myself getting 20- to 30-minute flights. This is easily my favorite electric model.

The other day, I was lucky enough to be present when Bob Sliff was testing the new prototype Astro Mini-Challenger. It's an exact, scaled-down (60-inch span) version of Astro's popular 2-meter Challenger. The prototype had a Cobalt 035 system in it and performed very well. The model made three good climb-outs and thermaled very well in light lift. Power-on and glide trim were the same, and the model exhibited no vices. The kit is slated to be released with the 035 flight system included. It should make an excellent ship for the novice flyer. No release date has been set yet, but I'll keep you informed as information becomes available. Keep your eyes open for these neat little electrics that are sure to become very popular; once you fly one you'll be hooked.

Till next time—good thermals and a full charge!

**The following is the address of the company mentioned in this article:*

Airtronics Inc., 11 Autry, Irvine, CA 92718.

HELI. CHAL.

(Continued from page 81)

elevator and tail rotor are still reversed, and the collective hasn't been adjusted properly. This makes inverted flying almost impossible and gives you the impression that it's harder than it really is.

With the helicopter at the proper altitude, a full tank of fuel and the idle-up turned on, fly the helicopter in slow forward flight into the wind until it's slightly upwind of your position. You should be looking at the rear quarter of the helicopter with it to your side rather than directly overhead. Apply full aileron to roll to the inverted position. As the helicopter rolls past 90 degrees, reduce the pitch to near 0 degrees, flip on the inverted-flight switch and stop the roll when in level inverted flight.

Initially, your main concern will be with elevator control, and my helicopters require a slight nose-down trim to maintain level flight. In any case, make only

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Product News

HAWKER HURRICANE

Vailly Aviation has just introduced a giant-scale model of the famous Battle of Britain Hawker Hurricane. The model is scaled at 2.3 inches to the foot, yielding a wingspan of 92 inches, an area of 1420 square inches and an overall fuselage length of 74.25 inches. The ship is designed to weigh between 18 and 24 pounds with an engine in the 2.2 to 3.1 cubic-inch range. Engines such as the Quadra Q-40 or the Zenoah G-38 provide realistic performance if the weight is kept in the 18- to 20-pound range. Plans and parts are available separately or as a package which includes a fiber glass cowl, a fiber glass belly scoop, a clear plastic canopy and an aluminum spinner with backplate. Pneumatic retracts are also available. For more information contact Roy Vaillancourt, 18 Oakdale Ave., Farmingville, NY 11738.

60 AIRCRAFT ENGINE

The National Pattern-winning YS-Futaba 60F model aircraft engine is virtually hand-built and features superior material and CNC machining quality, ABC design and YS/Futaba's unique, variable pressurization system. Other YS/Futaba features include adjustable pressure regulator, integrated carburetor design, special YS butterfly-type throttle and convenient, needle-valve adjustment. Available in both side (FS) and rear (FR) exhaust configurations, the YS/Futaba 60F is the choice of numerous national champions and world-class flyers. For more information contact Futaba Corporation of America, 555 West Victoria St., Compton, CA 90020.

GREAT PLANES

Combining the ease of a rear starter cone with the proven reliability and performance of the O.S. Long-Stroke engines, the 61 SF-HS and 61 RF-HS helicopter engines are designed to give top performance along the rpm curve. A rear starter cone allows easier and faster flying than ever before, without the fuss of belts or starter extensions.

The Hobbico Electric Fuel Pump is designed to be used with either a 6V or 12V power supply. It can also be used with its own internal batteries (4 AA-size batteries; not included). With a three-position switch, both filling and draining your tank are a snap.

For more information contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

ULTRA-FOAM

Ultra-Foam is an extremely lightweight closed-cell packing foam. It's used in R/C applications to protect receivers, battery packs, fuel tanks or any other items which might be damaged by harmful vibrations or by severe impact. Ultra-Foam is both fuelproof and waterproof to help protect your valuable equipment. Each package contains 6 square feet of 1/16-inch-thick foam. For more information contact Off-The-Ground Models, Inc., 606C West Anthony Dr., Urbana, IL 61801.

HIGH-TORQUE STARTER

The new Black Devil high-torque starter is perfect for starting up to a .90-size high compression and ABC-type glow engine that needs extra power for fast starts. The Black Devil starter utilizes a low-current consumption motor that will give you trouble-free starting with its one-touch power switch. Comes complete with a machined aluminum starter and rubber cone that will fit any R/C car, boat, airplane or helicopter engine with either cone or belt-type starting systems. For more information contact Circus Hobbies, 3132 South Highland Dr., Las Vegas, NV 89109.

SUPER FLOATS

The full-size Piper Cub is still used today as a float plane for moving people and freight in and out of remote areas. By using Super Floats and the CGM Piper Cub, you can simulate this activity and add a whole new dimension to flying. These 36-inch-long floats are easy to build, using all balsa and plywood construction. All necessary hardware to mount the Super Floats on CGM's Piper Cub is included. The hardware includes a rear float mount, dual rudders, pushrods and even a sub fin which increases stability. All that's needed to complete the kit is a bottle of Super Jet and a roll of UltraCote. Super Floats weigh only 24 ounces when complete and are designed for 6½- to 9-pound airplanes. For more information contact Carl Goldberg Models Inc., 4734 West Chicago Ave., Chicago, IL 60651.

ARF HEADMASTER

The new Headmaster from Top Flite Models is their latest ARF and features an all-balsa and plywood construction which is easy to repair. With all components fully covered and trimmed, and every conceivable hardware item included, you only have to add a 4-channel radio system and engine to get quickly and confidently airborne. The thick, semi-symmetrical airfoil, with its heavily rounded leading edge and huge surface area, is the secret to this model's capabilities as a stable and predictable trainer. The Headmaster features a wingspan of 59½ inches, a wing area of 714 square inches, a fuselage length of 53½ inches and a weight of 5¼ to 6 pounds. It requires a .40 to .46 2-stroke engine. For more information contact Top Flite Models, Inc., 2635 South Wabash Ave., Chicago, IL 60616.

POLK'S MODEL CRAFT

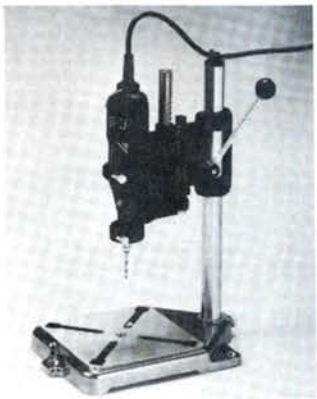
Wear your frequency and avoid mishaps with color-coded 75mHz Frequency Caps from Polk's. One size fits all. Hats are lightweight, breathable mesh with built-in sweatband. Made of 65 per cent polyester, 35 per cent nylon.

The first gas-powered aircraft from Aristo-Craft/Polk's Model Craft Hobbies is an easy-to-fly beauty. The Piper J-3 Cub is a .20- to .30-size all-wood ARF with training flight characteristics that make it a perfect choice for a novice. The Piper combines beauty and stability at an affordable price.

For more information contact Aristo-Craft/Polk's Model Craft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304.

DREMEL

The model 225 Flex-Shaft attachment has been introduced for use with Dremel's new Moto-Tool line. The 36-inch cable and pencil-thin handpiece attach to the Moto-Tool to provide lightweight, fingertip control of this high-speed do-it-yourself tool. The cable attaches easily to Dremel Moto-Tool models 395, 285 and 275. The handpiece uses a collet to hold a variety of Moto-Tool cutting, carving and engraving bits.



Hundreds of hobby projects requiring drilling can be done easily and precisely with the compact Drill-Press Stand available for use with the Dremel Moto-Tool line. The model 212 Drill-Press Stand accepts the new Dremel Moto-Tool models 395, 285 and 275, and is designed for precision drilling, routing and grooving.

For more information contact Dremel, 4915 21st St., Racine, WI 53406.

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News,** or guarantee of performance by **Model Airplane News.** When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Model Airplane News.**

HELI. CHAL.

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minor elevator adjustments while keeping the helicopter in slow forward flight. The rotor disk can be used to keep oriented to the helicopter's attitude. Try to get used to seeing the skids facing up rather than down, and remember that the controls still operate the same as they do during normal flight. During this stage of training, don't ever attempt to hover or make any turns, because it's easy to become disoriented. Rather, keep the helicopter in slow forward flight for 5 to 10 seconds and then roll back to normal flight, flipping the switch as the helicopter rolls past 90 degrees (again with the collective near 0 degrees). This makes for a rather short first inverted flight but, initially, you should place more emphasis on proper entries and recoveries, with longer time being spent on inverted flight as you build your confidence.

Another important point is that at no time should you ever attempt to turn the helicopter. It's very important to keep the helicopter in straight, forward flight so that you can concentrate on the elevator control. However, should the helicopter start a turn on its own, or you become disoriented, simply roll back to the normal upright position and flip the switch. In an emergency, if the helicopter starts descending rapidly with its nose low, it may be best to split-S back to normal flight.

Continue to practice inverted flying at a safe practice altitude for short periods, until you feel comfortable in your control during straight inverted forward flight. The next step is to practice turning, but now the helicopter will want to turn better in the opposite direction than when it was upright. This means that a helicopter with a clockwise blade rotation will turn better to the right than the left during normal flight because of the torque from the main rotor blades. However, when inverted, the blades are turning in the opposite direction in relation to the earth, and therefore the helicopter will turn better to the left. For a counterclockwise rotating system just the opposite is true, and the helicopter will turn better to the left while in normal flight and better to the right while inverted.

Remember, while turning, to get used to seeing the skids pointing up and maintain orientation with the helicopter by the rotor disk. Continue practicing turns both to the right and left to get a feel for the helicopter and the amount of tail-rotor coordination required, but still keep

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HELI. CHAL.

(Continued from page 94)

it quite high should an emergency recovery be needed.

Once you're comfortable with inverted forward flight and turns, it's a simple matter to make shallow descending turns and to slowly bring the helicopter into an inverted hover. The helicopter will be just as stable while flying and hovering inverted as it is while upright and, once you've hovered a few times inverted, you'll be wondering what the fuss was all about to begin with.

BALLOON

(Continued from page 64)

right propeller. The up/down motion of the left stick controls the up/down movement of both motors. The up/down motion of the right stick isn't used.

To test the right motor, move the right stick to the left side (toward the center of the transmitter). This will power the right motor in the forward direction. Move the right stick to the right side. Note that the right motor reverses direction. To test the left motor, move the left stick to the right side (toward the center of the transmitter). This will power the left motor in a forward direction. Move the left stick to the left side. Note that the left motor

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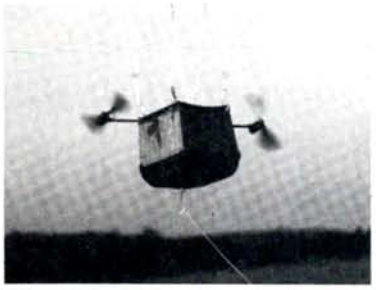
BALLOON

(Continued from page 96)

reverses direction.

To test the up/down control, move the left stick forward (toward the top of the transmitter). This controls the up/down motion of both motors for upward flight. Move the stick backward; note that the motors now face down for descending flight. Upward flight is controlled by driving both motors forward while they point upward and will move the balloon up. Move the left stick fully forward to point the motors in the upward direction. Move both the left and right sticks to the center, in order to power the motors in a forward direction. The left stick should be in the upper right-hand corner position. The right stick should be pointing to the left side. The balloon will now move upward.

For downward flight, driving both motors forward while they point downward will move the balloon down. Move the left stick fully backward to point the motors downward. Move both the left and right sticks toward the center. The left stick should be in the lower left-hand corner position. The right stick should point to the left. The balloon should move downward.



For forward and backward flight, drive both motors forward while they point forward to move the balloon forward, and reverse the motors for backward motion. Move both the left and right sticks toward the center of the transmitter. The balloon should move forward. Move both sticks away from the center of the transmitter to move the balloon backward.

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BALLOON

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Rotational motion is controlled by driving the motors in opposite directions, while they point forward to rotate the balloon. Move both sticks to the right to rotate the balloon clockwise (when looked at from below). Move both sticks to the left for counterclockwise rotation. I practiced with the balloon tethered until I became familiar with the controls, which are a little different from the single-stick transmitter that I'm used to.

To fill the balloon, follow these steps. Securely tie the provided tether line to one of the four basket suspension loops near the bottom of the nylon balloon shell. To avoid losing the balloon, make sure that the tether line is securely anchored. Be careful to avoid anchoring near any overhead obstructions. Next, place the latex weather balloon inside the nylon balloon shell. It was convenient to drape the nylon balloon shell and weather balloon over the hood of my car while filling them with helium. Orient the weather balloon opening so that it can slide over the helium tank filling nozzle. Next, pull the weather balloon opening over the helium tank nozzle. Fill slowly enough to allow adjustment of balloon and canopy, and keep the filler neck centered in the bottom of the canopy or shell opening. Continue filling the balloon until only a few wrinkles remain in the middle of the nylon shell.

When properly filled, the balloon should be pear-shaped. If you've overfilled the balloon, carefully leak out the excess helium. Then fold the latex balloon neck upon itself and clamp with the binder clip provided. When the balloon is filled, hook the four string loops on the bottom of the nylon shell over the four retaining hooks on the top of the gondola basket.

You're then ready to adjust the ballast for flight. To adjust the balloon for flight, neutral balance must be obtained. Ballast in the form of eight small sandbags is used to effect this balance. Neutral balance means that the balloon neither rises

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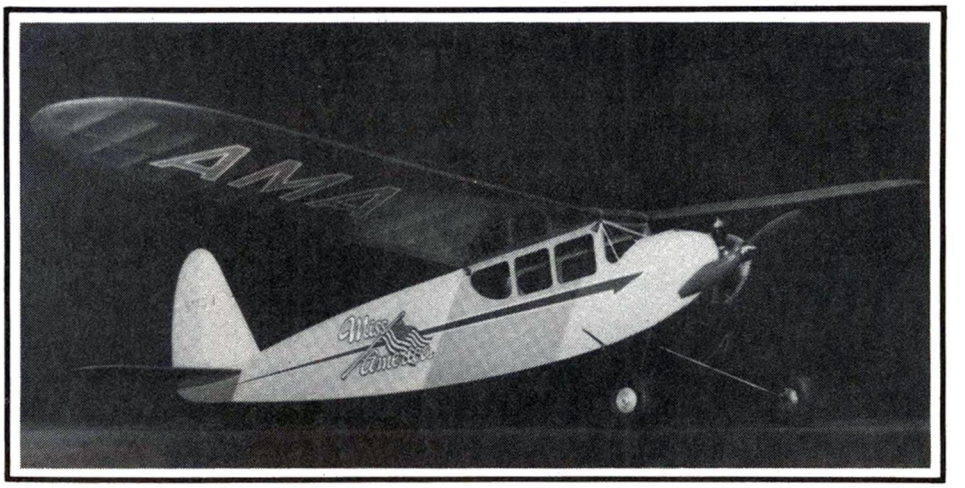
Small Steps

by JOE WAGNER



This ½-size replica of the 1937 "Miss America," designed by the writer and published in MAN *in 1960, makes an excellent R/C model with .020 power.*

IN MY PREVIOUS COLUMN, I mentioned a new criterion called Volumetric Loading (VL) for figuring how much an R/C model should weigh. To calculate this value, you multiply the model's wing area by the rib's maximum depth and divide the result into the model's weight in ounces.

For schoolyard-type R/C flying, the VL value should be between .06 and .10. A VL of much over .12 means that the model is probably too heavy for the kind of slow, relaxed flying we're talking about here in "Small Steps."

My colleague Randy Randolph, brought up a question on this topic and showed me that it needed more explanation. I should have made it clear in my text that I was talking specifically about wings with airfoils such as the Clark "Y" and NACA 6412; the kind commonly referred to as "lifting sections."

I don't have a lot of information on symmetrical airfoil performance in lightweight R/C models, but I do have data

Formed-to-airfoil sheet balsa wings, such as these on the "Osprey," are light, strong, efficient and ideal for schoolyard R/C.

from my U-Control stunt model designs. It seems to me that we should just compare their VL values with their flight performances by taking just *half* the thickness of a symmetrical wing to calculate its effective VL value.

An airfoil's upper camber furnishes most of its lift. Even at a high angle of attack, the curvature of a symmetrical airfoil's underside must have some detrimental "negative lift" effect working against the positive lift generated by the attack angle.

My VL formula also doesn't work for single-surface wings such as the steam-formed sheet-balsa ones I've been using on my Starling and Osprey. For instance, the Starling figures out to a VL of almost .20, while the Osprey works out to .14. However, both are slow, gentle flyers.

Perhaps the most important variable is the height of the maximum curvature of the *camber mean line.* For a Clark Y or similar airfoil this would be half the maximum height of the section. On a single-surface wing it would be the maximum camber height minus half the thickness of the wing material. Worked out this way, the thin, formed, sheet-balsa airfoil and the Clark Y have identical mean camber lines. But, on a symmetrical airfoil, the mean camber line is flat!

Hence, a pragmatic approach looks like the best way to go. Comparing the known flight performance of models using various types of airfoils with their weight and geometrical measurements, here's how it seems to me:

For lifting sections, use the original VL formula: weight divided by the product of wing area times maximum airfoil thickness. For symmetrical airfoils, calculate the VL value in the same way, then multiply by 2. For sheet-balsa wings with formed-camber airfoils, *divide* the calculated VL by 2.

That, as we aeronautical engineers say, ought to be close enough for government work!

Keep it Light

Randy and I have been nagging you for months about keeping your R/C models light. Lightweight airplanes take off more easily, fly better, glide flatter, land more gently and, when they do happen to hit something, they're not usually damaged much. Here's another reason for keeping your R/C airplane light: You can control it more consistently.

When a control surface such as a rudder is deflected, its effect on the flight path depends on the airspeed. A fast-flying airplane needs very little control-surface movement, while a slow one requires much more.

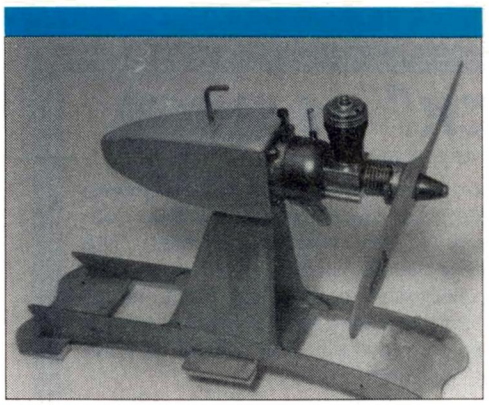
With small R/C models, this characteristic becomes bothersome in two ways. First, it's tough to get a small range of control-surface motion using conventional R/C servos and control horns. Even connecting the innermost hole in the servo output wheel to the outer hole in a small-sized horn results in quite a lot of control-surface deflection when you move

the transmitter stick from one extreme to the other. A slow-flying model can use all this motion nicely, but it may make a fast airplane too touchy for comfort.

The second problem lies in the speed variation of a maneuvering aircraft. If an airplane flew at exactly the same speed at all times, 10 degrees of up elevator (for example) would always produce a perfectly circular inside loop of a specific size. But our R/C models don't maintain a constant speed. They slow down when climbing, accelerate in a dive and build up speed in turns.

Lightweight airplanes don't vary as much in velocity as heavy ones do. With less weight to lift, when light models climb they maintain airspeed well and aren't prone to unexpected stalls. Light models don't gain speed too fast in dives and, in turns, a lightweight airplane's speed doesn't vary much.

That's why the controls of a light R/C model seem to work more consistently than those of an overweight airplane. Airspeed variation means varying control effectiveness; the less the model's speed changes during maneuvers, the less you'll have to fiddle with the sticks to compensate for these changes.



Power pod for a Goldberg "Gentle Lady." An auxiliary fuel tank inside adds five minutes to the running time of the stock Cox .049 tank.

The earliest version of the G-Mark .061 was called the "Seagull." It was an excellent performer, but somewhat fragile.

Something Different

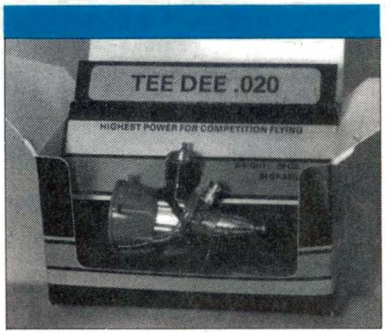
Several readers have asked me about the availability of kits or designs for 1/2A R/C models. There aren't a lot of kits on the market specifically intended for 1/2A R/C and, other than Flyline's out-of-the-ordinary selection of scale models, most 1/2A R/C kit designs look pretty much alike.

However, there are lots of plans available from various sources for scratch-built models that are suitable for radio control. Some are specifically designed for the purpose; others are for free-flight airplanes which can be adapted to R/C with a little ingenuity.

For example: In 1959 I took Scientific Models' 1937 "Miss America" free-flight kit design and reduced it to half its original size. My 42-inch-span Miss America was Cox Pee Wee-powered, and *MAN* published the plans in 1960. Of course, the plans were for a free-flight model, but some readers made R/C conversions of it. Bill Winter (then editor of *MAN*) was one who did this. His model flew so well that Scientific Models decided to issue the half-size Miss America as an R/C kit!

Two of Comet's rubber-powered free-flight scale models can be made into excellent .10-powered R/C airplanes: the Taylorcraft and Aeronca "Chief." Both have 54-inch wingspans. Their fuselages need a bit of beefing up, but their basic designs are well done and not difficult to build, even as engine-powered R/C conversions.

Another fairly easy way of coming up with an off-the-beaten-track, small R/C model is with a Xerox copier that has enlarging capability. The newer ones can make a copy as much as 41 per cent larger than the original. If you take the plans for a small, rubber-powered model such as Comet or Peck Polymers sell, and enlarge them to 141 per cent size (which will probably require several pages), you'll then have the plans for a model with exactly twice the wing area of the original.



This is another of Cox Hobbies' jewel-like power plants. The Tee Dee .020 is great for the smallest R/C models.

If that's not big enough, enlarge the copies to whatever size you want. You'll need to piece together the plan sections with tape, but that isn't difficult; I've done it myself lots of times!

A couple of readers have asked about the .049-powered "Gentle Lady" pictured in this column a few months ago. They say: "Why perch the motor way up on top of the wing like that? If you mount the engine on the nose, you'll save an ounce or more of balance weight, plus all the

(Continued on page 106)

BALLOON

(Continued from page 100)

nor drops. To achieve this, you must remove ballast bags from the gondola until neutral balance is obtained. If the balloon continues to rise with all the ballast aboard, you can either add a small bag of pennies or leak some helium from the balloon. A properly balanced balloon will rise when lightly pushed upwards.

Our first flight was attempted outdoors in the late afternoon and was quite successful. I recommend that those of you who buy a Rozier balloon try it out first in a local gym or some other facility with a high ceiling. I've found that the balloon is quite difficult to control in wind. The Rozier was actually a gift to our daughter Sue and we've had a lot of fun flying it. Incidentally, she crews and flies with a real hot-air balloon team here in New Jersey. The Rozier sells for about $300 and is complete in all respects except, as already stated, for helium.

The Challenger 4000 system has worked flawlessly throughout our flights. The project was highly enjoyable and quite different from the fixed-wing birds I usually fly. For further information, please contact RC ETC and say you read about the Rozier balloon in *Model Airplane News*.

**The following are the addresses of the manufacturers mentioned in this article:*

RC ETC, 1024 Club Drive, Suite 140, Moraga, CA 94556.

Aristo-Craft Products; Sole distributor: Polk's Modelcraft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304.

SMALL STEPS

(Continued from page 105)

drag of that engine-mounting structure."

That thinking seems logical, and lots of powered gliders, like the Gentle Lady, are flown successfully with nose-mounted motors. But airplanes don't always obey the laws of logic, and it's been my experience that a pylon-mounted engine on a big model will produce more useful thrust than one attached to the front.

This might have something to do with the drag the fast-moving propeller slip-

(Continued on page 118)

NAME THE PLANE CONTEST

Can you identify this aircraft?

If so, send your answer to **Model Airplane News,** Name the Plane Contest (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.

Congratulations to Jennings Holt, Jr. of Loretto, TN, for correctly identifying the Breguet 1001 Taon (Horsefly) in the February issue. Jennings' name was drawn from the seven correct entries received. The Taon was designed to meet the NATO requirement for a lightweight strike fighter. The first of three prototypes was flown on July 26, 1957. Size-wise, the Taon fell into the same general category as the British Folland Midge, subsequently called the Gnat. The prototypes used the early version of the Bristol Orpheus B.Or.3 turbojet which produced 4,850 pounds of thrust.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail and will receive a free one-year subscription to Model Airplane News. If already a subscriber, the winner will receive a free one-year extension of his subscription.

Club of the Month

Kansas City R/C

A group by the name of "Kansas City Radio Control" is the *Model Airplane News* "Club of the Month" for April 1988.

This group of tireless fliers, headed by club president, Pat Little, holds a host of events throughout the regular flying season, as well as some off-season events, including an "Icicle Fun Fly"!

More than 60 people attended this year's Icicle Fun Fly, and 35 of them were prepared to fly! If this club were located in a more temperate climate, we wouldn't give it a second thought. But, in their area, winter temperatures can plummet into the single digits! Needless to say, this is a bunch of dedicated fliers! To fight frostbite, the participants chowed on "Doc" Eaden's killer chili (for those who can't get enough of the stuff, the recipe is included in their newsletter) and huddled around the fire sipping hot coffee or hot chocolate.

Other interesting items on their 1988 agenda include the transmitter testing done by Tom Runge and Steve Gooseman (of Ace R/C); the KCRC Auction, where club members buy and sell aircraft; a Jet Fan Fly; the KCRC Pattern Contest and a variety of other club-sponsored events.

"Contacts," the monthly club newsletter, is under the watchful eye of editor Charley Reed. Included in the newsletter are columns from the president and editor, as well as interesting articles by club members.

It's with great pleasure that the staff of *Model Airplane News* has chosen the Kansas City Radio Control Club as our Club of the Month for April 1988. This is one of the most enthusiastic groups of fliers that we have heard of. They are obviously dedicated to furthering the hobby/sport of model airplane flying.

Two free one-year subscriptions will be awarded to KCRC, to be given by them to a couple of the club's outstanding members. Congratulations! ■

Each month **Model Airplane News** will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). **Model Airplane News** will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletter to **Model Airplane News**, Club of the Month Contest, 251 Danbury Rd., Wilton, CT 06897.

SMALL STEPS

(Continued from page 106)

stream produces as it passes along the fuselage. Maybe it's something more subtle and mysterious. All I know is that the pylon-mounted engine works, and it sure keeps oily exhaust residue away from the radio access hatch!

News item: Cannon Electronics (makers of the world's smallest and lightest R/C equipment) and its associated mail-order outlet, Charlie's R/C Goodies*, have moved. Now they're at 2828 Cochran St., Suite 281, Simi Valley, CA 93065. The new phone number is (805) 581-5061. If you're planning to visit, be sure to call in advance. ■

AIRWAVES

(Continued from page 10)

Blue vs. Grey... Again!

Can you imagine the shock I felt in reading your report about the Raleigh Aero Masters Club, during which you acknowledged ignorance of that fine Ol' Southern tradition, Suh, called "Pig-Pickin'." No wonder you Yankees lost the War!

So that you will improve with age (if it's not already too late), please be advised that a pig pickin' is exactly what the name implies: picking the succulent, tasty, well-seasoned and sauced pork from the frame of the lucky pig chosen for this signal honor. Some pig-pickers are also full of "sauce" of a different kind by the time the pig is cooked! Not modelers, however.

The porker is dressed (undressed, really) in the normal manner as though being prepared for your frozen food locker. However, instead of being cut into the familiar pork chops, sausage, hams, shoulders, etc., the animal's backbone is split from head to down there, and it's spread-eagled on a wire frame over a bed of glowing wood coals—preferably hickory or oak. It's liberally dowsed, frequently with the cook's favorite barbecue sauce (often a well-kept secret), and turned over from time to time so that both inside and outside of the porker are exposed for sufficient time to the coals, to become properly, tenderly, tastily and tantalizingly cooked. The aroma is heavenly and sets all taste buds aglow.

This is "barbecuing" the pig and takes several hours. Of course, there are all those delicious accompaniments, such as slaw, hushpuppies (cornbread patties cooked in round-shaped chunks about two or three fingers wide and about that long), pickles, potato salad, and anything else the well-bred Southern cook decides will enhance his pig-picking.

When everything is ready, long lines form on each side of the pig, and the guests move down the table, picking those delicate morsels of barbecued meat from the pig. The best picking is done with the fingers. That lean, inviting meat makes anybody want to "pick it" from its natural home base! No doubt you'll get hundreds of informative notes on this subject! Good Luck!

By the way, years ago when Southern homes had hunting dogs, the dogs often

(Continued on page 126)

Classified

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WANTED: Model engines made before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105; 806-622-1657.

WANTED: GERMAN DIESEL, (e.g., Taifun, Webra, Jaguar) or early glow engines (e.g., Webra Big Ben 5cc, Webra Sport Glo A956), only new or NIB. Also German free flight and early R/C-kits. Will pay fair prices. Dr. W. Sturn, JM Strasser Feld 29, D-512 Herzogenrath, W. Germany; 2406-5952.

SCALE DOCUMENTATION: PLAN ENLARGING. Photo packs, 3-views, drawings for 1,600 aircraft. Super-scale R/C plans for Giant, Sport; 43-page catalog $3. Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403; 919-292-5239.

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WANTED: Berkeley and Cleveland kits or related items: parts, plans, boxes, brochures, books, ads, radio equipment, accessories, etc.. Gordon Blume, 4649-191st Ave. S.E., Issaquah, WA 98027.

"LEARNING TO FLY R/C With or Without An Instructor," $2.95 plus .56¢ postage. Jim Waterman, 3818 Deerfield Dr., San Antonio, TX 78218.

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AIRWAVES

(Continued from page 118)

barked a lot at mealtimes. Cooks often tossed fist-sized wads of cornmeal into whatever was cooking and, when it solidified enough to be handled, the cook would throw them to the dogs with the admonition to "Hush! Puppy!" So cornbread cooked that shape and way is called "Hush Puppies"!

CLETUS BROCK
Mount Olive, North Carolina

Hot dang... I declare I ain't never heard of somethin' so delishus since I lived in the fair city of Goldsburra, North Carolanah. Y'all care to swap your pig for a subscription? Throw in some chitlins, grits, sow belly and black-eyed peas! Incidentally Mistuh Cletus, just for the record... we did *win... I think...* RAU

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News,** 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.

ADVERTISER INDEX
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